

In This Issue: Analyzing True
Cost of Scraper Operation

June, 1961

ROADS ^A _N _D STREETS

A GILLETTE PUBLICATION



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1. JACKSON VIBRATORY COMPACTOR. On any major paving project involving the compaction of granular soils, from sand to large rock, or soil-cement mixes the JACKSON MULTIPLE VIBRATOR COMPACTOR will save its cost in jig time. It's faster in attaining 100% of specified density, more economical to operate and maintain, and has far greater job adaptability than any other machine. Each of the 6 compactor units delivers 4200 3-TON BLOWS PER MINUTE. The 4 outer units can be instantly raised for road travel or greater maneuverability around other equipment. Each compactor unit can be detached, fitted with operating handle and used as a self-propelling compactor to get into places other equipment can't reach. With side towing device no other equipment can rival it on widening operations.

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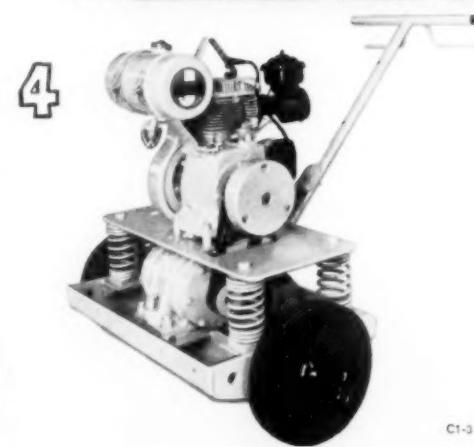
3. JACKSON SURFACE TYPE PAVING TUBE. Equipped with very powerful vibratory motors, tremendous energy is imparted to the freshly spread concrete, puddling thoroughly even the harsh and dry mixes. The tubular bases can be supplied in the exact width to fit the job. Attaches to Spreader or Finisher.

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FOR SALE OR RENT AT YOUR NEARBY JACKSON DISTRIBUTOR
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JACKSON VIBRATORS, INC.
LUDINGTON, MICHIGAN

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C1-3



H. J. Williams Company, Inc., of York, Pa., was general contractor; subcontractor for overpasses: John H. Wickersham Engineering & Construction, Inc.; guard rail erected by L. S. Lee & Son, Harrisburg; steelwork fabricated and erected by Lehigh Structural Steel Company, Allentown, Pa.

This interchange is a showcase for Bethlehem road steels

This double interchange is near Lancaster, Pa., connecting Route 230 By-pass, Route 222, and Route 501. Built into the concrete pavement are Bethlehem bar mats, dowel units, and other paving steels. Bethlehem structural steel and reinforcing bars were used in the overpasses, and Bethlehem cable guard rail protects various points in the interchange.

Bethlehem supplies the largest line of steel products for highways in the country—quality steel products for every operation from ground-breaking to completion of the road. Whatever your needs, you can count on this single source for steel products with reliability, rugged performance, and full compliance with state and federal standards.



for Strength
... Economy
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ROADS AND STREETS

JUNE, 1961

HIGHWAYS • BRIDGES • AIR FIELDS • HEAVY CONSTRUCTION

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FRONT COVER SCENE

Use of hinged sheets of wire reinforcement, as a labor saver, made one of its first appearances last year on the concrete paving project pictured: a section of Route 17 relocation near Monticello, N. Y., Merritt-Chapman & Scott Corp., New York, contractor. The hinged sheets reportedly cut both shipping and job handling costs, the 7 ft. folded width permitting flat-bed delivery over the road to the job.



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doesn't just happen!



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MODEL
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PULLSHOVELS • TRUCK CRANES

3/4 to 3
Cu. Yd.
Capacity

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THIS is a Northwest 80-D—a 2½ yd. shovel in a heavy rock cut on one of the west mountain roads. It's built for rock—proved in rock work not only from Florida to Alaska and from Maine to California but all over the world. The 80-D is the dependable workhorse of the 2½ yd. field and it is the choice of leading contractors whose business is moving rock. Northwest made it a real Rock Shovel. It didn't just happen!

Take a look at it! The solid cast alloy Steel Machinery Bases with cast alloy steel Machinery Side Frames would be massive in a machine of greater capacity. They take the shock of rock digging and eliminate constant rebuilding. The Crowd—different—Dual Independent, an Automatic Crowd plus an Independent Crowd—utilizes force most independent crowds waste—handles the tough digging with greater ease—makes easy digging easier and gives greater output. With the big Uniform Pressure Swing Clutches there's no jerk! No grab! Just a smooth swing that makes it easy to spot the load. There's the Feather-Touch Clutch Control that gives the true feel of the load in nudging the teeth under a big one or in probing a partly shot ledge of rock. There's the Cushion Clutch that eliminates the shock overload on operating mechanism, increases cable life, and makes ample power safe. And finally—plenty of power to get the rock out!

It's a rock rig through and through with the advantages that assure output—not just for today—but for tomorrow, month after month.

There is a lot more to tell you. Details make equipment. Dig into them. A Northwest man is at your service.

NORTHWEST ENGINEERING COMPANY
1504 Field Building, 135 South La Salle Street, Chicago 3, Illinois



NEW

A five-minute test for density and moisture

The instrument pictured above is the "Hydro-Densimeter," a new electronic device which uses nuclear materials to test soils, aggregates, and surfacing materials, particularly for their density and moisture content.

It has now been thoroughly field tested, not only by the inventors but by construction men and inspectors, for accurate determination of earthwork compaction. It checks very well indeed with traditional testing methods.

It takes only five minutes for an inspector or contractor to tell precisely if specifications are being obtained. If you can push a button and read a scale, you can operate this system. No AEC license required.

**VIATEC DIVISION, TELLUROMETER, INC.
206 Dupont Circle Bldg., Washington 6, D. C.**

Please send detailed report on the "Hydro-Densimeter" to:

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Title.....

Organization.....

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ROADS AND STREETS

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Rural Roads • Street Engineering
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"40,000 cu. yds. loaded out in record time"

. . . say field reports about these two BAY CITY shovels. Owned by K & R Construction Co. of Camillus, N. Y., they are loading bank run gravel for use as sub-base material on the Empire Stateway Interstate Route at Syracuse. Fourteen trucks are needed to keep up with the two machine's output of 2300 to 2500 cubic yards per 8-hr. day.

You can't help admiring a BAY CITY'S digging ability. Smooth, balanced power is provided through a fluid coupling and speed reducing unit of helical cut gears running in oil. A one-piece continuous chain with automatic adjuster gives positive, powerful and independent crowd action. Power-operated retract is twice as fast as crowd . . . provides positive control of dipper handle throughout the dig-swing-dump cycle. Mechanical power-controlled boosters set the main



drum clutches with minimum effort. Smooth acting swingers are engaged through needle bearings on hardened tapered keys — a combination that means quick response, fast swing.

BAY CITY crawler machines are offered as $\frac{3}{4}$ - to $1\frac{1}{2}$ -yd. convertible excavators and as 20- to 30-ton erecting cranes. Truck-mounted CraneMobiles, with lifting capacities of 25- to 40-ton, are also available. Ask your local BAY CITY dealer to give you the complete story. Do it today!

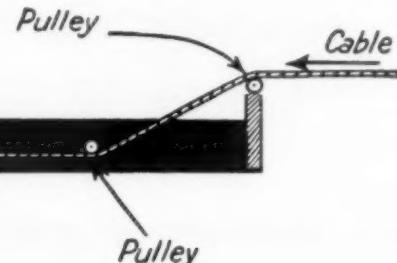
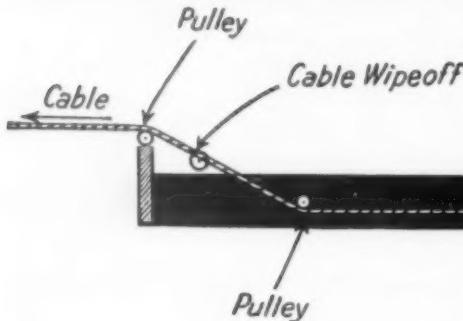
BAY CITY SHOVELS, INC.
2611-C Center Avenue
BAY CITY, MICHIGAN

a subsidiary of Unit Crane & Shovel Corp.

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LUBE LOGIC

5 new ways



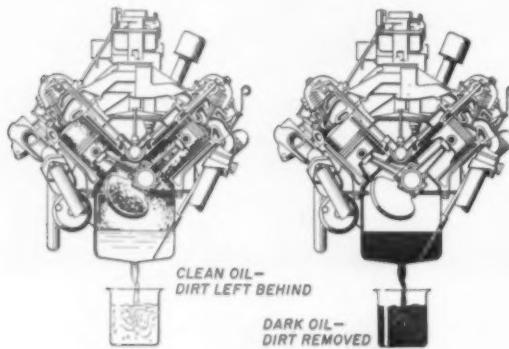
Warm bath restores wire rope

The best way to get lubricant inside a cable, where it's really needed, is to immerse the cable or wire rope every 500 hours or so in a bath of warmed-up Texaco Crater A lubricant. It pays off by giving you far longer service life than you would get simply by applying Crater A externally.

This warm-bath treatment requires a horizontal trough to hold the lubricant. The trough should be fitted with pulleys to keep the cable completely submerged while it's passing through. A burlap collar should be rigged to wipe

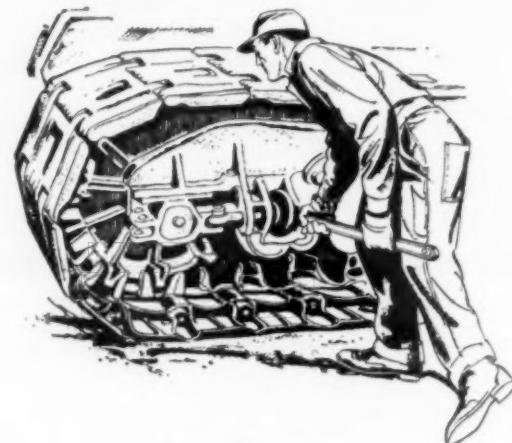
off excess lubricant as the cable leaves the box. An immersion of about a minute will allow the lubricant to work well into the strands.

This process is *not* an alternative to other lubrication. You should continue to clean the cable and apply Crater A externally every 10 to 100 hours, depending on the type of work the cable is doing. Remember also to be very sparing with lubricants on cables that wind on clutch-equipped drums, and never lubricate cables that are dragged in dirt.



Dark engine oil . . . sign of a hard worker

Here's a motor-oil misconception that's still common enough to need discussion. Some folks think that the better an engine oil is, the more likely it is to come out as clean as it went in. The truth of the matter is just the other way around. A good detergent-dispersant oil holds onto dirt like an old friend. It keeps dust, soot and carbon in suspension, and carries it out of the engine when you drain the oil. Oil that looks clean when you drain it from the crankcase is a sign that these contaminants may still be inside the engine. Moral: oil that darkens in use is really doing its job.



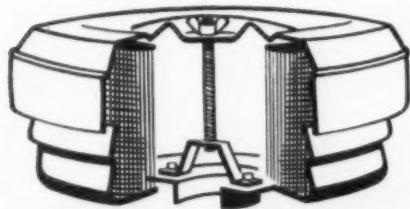
No-sweat way to adjust crawler treads

Crawler treads are easier to adjust if you dab a little Texaco Threadtex on the adjusting screws. The Threadtex stays put through months of service, keeps the screws free-turning and corrosive-proof. Another good use for Threadtex is on track bolts, when you're making up track. A little dab of Threadtex on the bolts will save a lot of time and work in taking down track after it has been in service.

to trim downtime

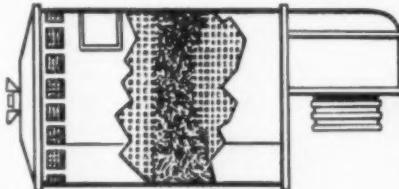
Key points on air filter maintenance

In a day's operation a typical engine inhales several thousand cubic feet of air, and on a construction project all that air is probably loaded with abrasive dirt and dust. Good air-filter maintenance is the only way to make sure your engine gets the air and *not* the dirt. Here are some maintenance tips that will keep your air filter working better through thick and thin.

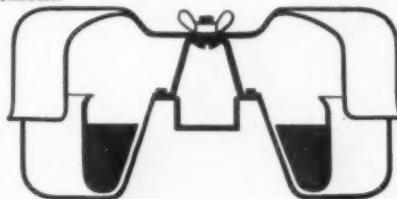


Dry type air cleaners (the ones with the fluted paper element) should simply be shaken or tapped lightly to remove dirt, and reinstalled. Never clean dry-type elements with kerosine or diesel fuel.

Additional precautions: empty centrifugal pre-cleaners when the glass container is half full; don't remove the oil cup when the engine is running.



If your filter is the wire gauze type, and you want to re-use the element, wash the gauze in kerosine or diesel fuel, shake it dry (*don't* blow it with compressed air) and re-oil it with SAE 40 or SAE 50 oil to coat the element.



Oil-bath type air filters won't function properly if there's more than a half inch of sediment at the bottom of the oil reservoir. Check the sediment level by sticking a screw-driver down into the oil, and if you're anywhere near the half-inch level the bowl should be cleaned out and refilled. Also, inspect the filter every 5 to 50 hours to make sure the oil itself is at the right level. Every 500 hours the whole cleaner should be dismantled and cleaned, and refilled with new engine oil of the same grade used in the crankcase.

New Texaco movie can help boost your profits



This factual, down-to-earth presentation shows you how 1% of your total budget (the amount usually spent on lubricants) can minimize a major cause of equipment downtime.

SEE: How the biggest engineering job ever undertaken was 90% lubricated with only *four* different products.

SEE: How one contractor lubricated 21 different types of equipment with only seven products.

SEE: "A Plan for Profits"—Texaco's newest sound and color movie.

FOR AN EARLY SHOWING contact your Texaco Contractor Representative now.

TEXACO LUBRICATION ENGINEERS

Every month or so we'll bring you a batch of "sleepers"—little angles, so easy to overlook, where big savings in time and money can be made. But month in, month out, your local Texaco Man is your best source of money-saving lubrication ideas. Don't forget that "Lubrication is a major factor in cost control." Texaco Inc., 135 East 42nd Street, New York 17, N. Y.

TUNE IN: TEXACO HUNTLEY-BRINKLEY REPORT, MON. THROUGH FRI.—NBC-TV

TEXACO
Throughout the United States
Canada • Latin America • West Africa

NEW PEAK IN DIGGING EFFICIENCY!

Here's smoother operation, greater all-out digging power in a 12½-ft backhoe. Near-zero-friction design of new International Wagner No. 1250 backhoe speeds action, puts more hydraulic power to work on digging.

Improved bucket mounting enables the "1250" to handle many digging jobs that only hand labor could do before. You can reach out to dig underneath sidewalks or other obstacles, or even trench beneath the tractor itself. Now you can dig holes with straight walls all the way down to the bottom of the cut on all four sides! For example, as far back as 17½-feet from the tractor's rear axle, you can dig vertical six foot walls.

Close-coupling to tractor makes maneuvering easier in tight quarters, improves tractor balance. Heavy-duty box-beam design gives great strength without excess weight.



Ball
trunnion
bearings
cut
friction
70%



Self-aligning spherical trunnion bearings are used at all major pivot points. A double trunnion bearing is used within the swing frame itself. Friction is 70% less, while destructive twisting forces and strains are swallowed harmlessly. Bearings provide exceptional wearing quality with a minimum of service.

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Pair this efficient new digging tool with the economical 47 hp* International 340 or the heavy-duty 61 hp* International 460 for new high-speed trenching capacity. See your IH dealer soon for full details about the rugged "1250" backhoe and a tractor power-sized to your needs.

*Maximum engine horsepower at standard conditions



INTERNATIONAL HARVESTER



Stand-up-ability—strong reason why more and more roads are . . .



GUARDED BY GALVANIZED STEEL

Guard rails of galvanized steel are gaining favor . . . fast! Big reason: stand-up-ability . . . a neat knack of holding the line not only against impact, but also against the more gradual gnawing away that is done by time and the elements. From their inner steel core to their outer zinc coat, galvanized guard rails and median barriers stand up long and strong to deliver topmost protection with minimum cost and upkeep.

WEIRKOTE® IN PARTICULAR—You gain when you specify long-life galvanized steel for your guard rails. And you gain even more when you specify National Steel's Weirkote. To the inherent strength of steel, Weirkote adds *enduring* zinc protection. Weirkote is manufactured by two National Steel divisions, Weirton Steel and Midwest Steel. For complete details, write Weirton Steel Company, Weirton, West Virginia.



MIDWEST STEEL

Portage, Indiana

WEIRTON STEEL

Weirton, West Virginia



Divisions of
NATIONAL STEEL CORPORATION

*The newest reason to make
your next tandem a FORD:*

'61 FORD HEAVY DUTIES GIVE TWICE THE CAB, FENDER AND RADIATOR LIFE!

Rugged Ford Heavy Duties utilize heavier gauge steel, sturdier reinforcements, and a new independent mounting system to separate cab, fenders and radiator. This stronger construction, with each component *individually* frame-supported, doubles cab, fender and radiator life—cuts downtime delays and maintenance expense.

CAB—A 25% heavier floor pan and toeboard provide a solid base for greater cab durability. New full-length door pillar reinforcements and stronger inner door panels minimize door sag. New triangular mounts keep cab level and protect it from frame-movement stresses.

FENDERS—Ford fenders are 25% heavier gauge, too. They are bolted to a rubber-cushioned transverse support in front

for needed flexibility. Fender-wide rear brackets provide necessary rigidity. The removal of only 9 bolts permits pulling the fender assembly for easier access to engine.

RADIATOR—New Ford "lock-seam" construction doubles the solder area on key seams, and heavier gauge tank and header walls provide increased radiator strength. "Horse collar" mounting on rubber pads soaks up vibrations and diagonal braces at sides give solid support.

Ford's separate mounting of cab, fenders and radiator frees them from frame-movement stresses that occur when these parts are rigidly attached to each other. Result: failures and service costs are reduced even in tough off-road operation.

Ford T-Series tandem rear axle trucks and tractors are available with GVW's up to 51,000 lb.—GCW's up to 75,000 lb. Your choice of Timken or Eaton axles with up to 38,000 lb. tandem capacity. Seven exclusive-truck V-8 engines range from 302 to 534 cubic inch displacement.



SEVEN MORE REASONS WHY IT'S GOOD BUSINESS TO DO BUSINESS WITH FORD!

You save from the start with Ford's traditionally low prices, and your savings continue with low operating and maintenance costs. These facts are documented by certified test reports from America's foremost independent automotive research firm. Ask to see these reports. They're on file at your Ford Dealer's.

In addition to these dollar-and-cents savings, the following bonus benefits are yours with Ford Trucks:

- 1. Rigid quality controls** give you the strongest safeguard of truck reliability ever. Modern, exclusive-truck manufacturing facilities, with emphasis on quality every step of the way, are designed to give you a Ford Truck that is as free from defects as a truck can be. Tangible results of these high standards are Ford's new warranties.
- 2. Exclusive 100,000-mile warranty** (or 24 months) on 401-, 477- and 534-cu. in. Super Duty V-8's is the most liberal in the industry. Each major engine part (including block, heads, crankshaft, valves, pistons, rings), when engine is used in normal service, is warranted by your dealer against defects in material or workmanship for 100,000 miles or 24 months, whichever comes first. The warranty covers full cost of replacement parts . . . full labor costs for first year or 50,000 miles, sliding percentage scale thereafter.
- 3. 12,000-mile warranty** (or 12 months) on all 1961 Ford Trucks of every size is further evidence of the confidence

Ford has in its quality controls. Each part, except tires and tubes, is now warranted by your dealer against defects in material or workmanship for 12 months or 12,000 miles, whichever comes first. The warranty does not apply, of course, to normal maintenance service or to the replacement in normal maintenance of parts such as filters, spark plugs and ignition points.

4. Special fleet financing can be arranged by your Ford Dealer. It's available for owners of two or more trucks, and provides the opportunity to precisely tailor payments to your income patterns or depreciation schedules. This fleet-fitted financing offers substantial savings and frees your working capital.

5. Sales engineers and service specialists in 36 district offices are on call to solve special truck problems. Working with both dealers and customers, these experienced truck men represent another extra step Ford takes to provide your continued satisfaction.

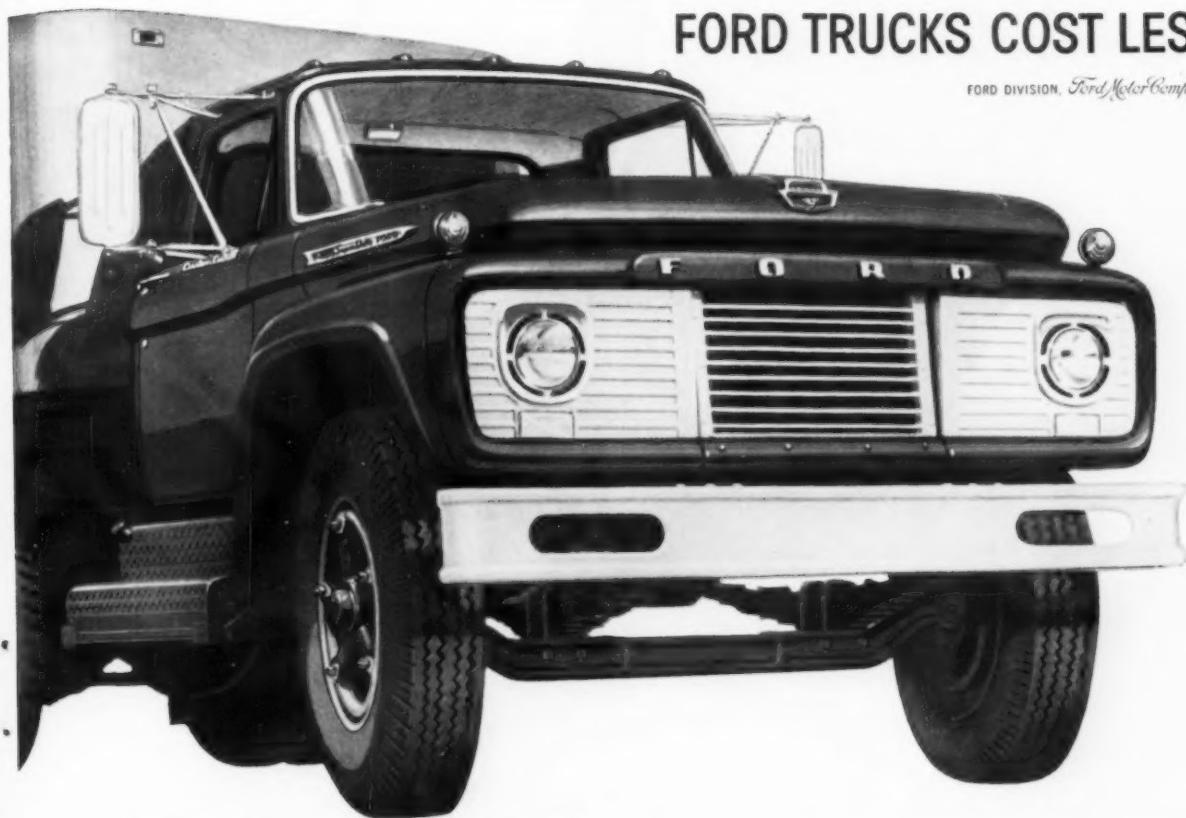
6. Replacement parts depots at 26 strategic locations across the country quickly supply needed parts from ample stocks. Ford's entire supply system is geared to give you faster service and reduce costly downtime . . . wherever you are.

7. 6,800 Ford Dealers, including 280 specialized Heavy Duty truck dealers, can keep your trucks ready to go wherever they go. From coast to coast, fast Ford service—gas and Diesel—is always close at hand.

From Super Economy pickups to Diesel-powered tractors, you can now fill every truck need up to 76,800 pounds GCW with a modern, money-saving Ford Truck.

Quality-Built...Maintenance-Engineered FORD TRUCKS COST LESS

FORD DIVISION, *Ford Motor Company*.



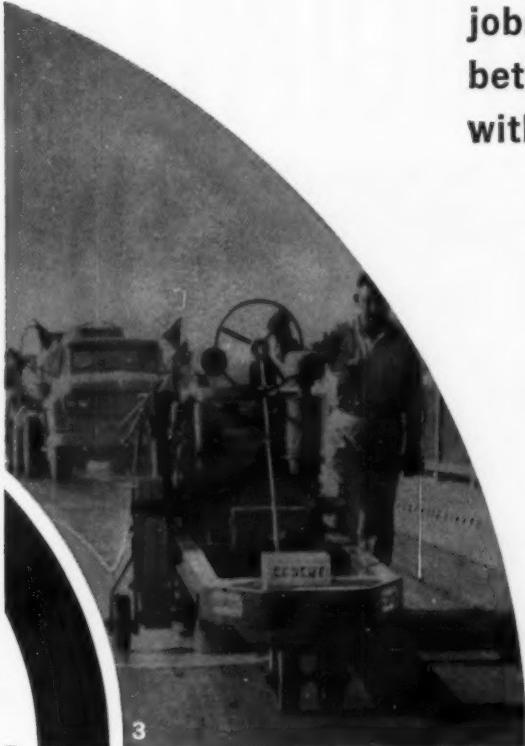
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ROADS AND STREETS, June, 1961



Industrial diamonds cut practically everything...especially your production costs

Each of these jobs is done better and cheaper with diamonds



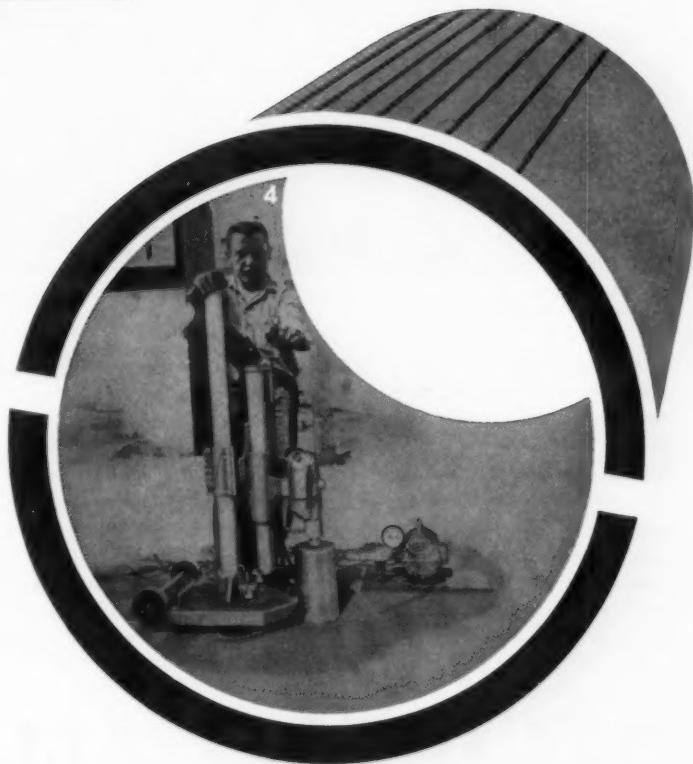
3

- 1 **Cutting Transverse Joints in concrete roads.** Machine with two small natural diamond saws handles this job quickly and efficiently. Unit is built by Concut Sales, Inc., El Monte, Calif.
- 2 **Cutting Transverse and Longitudinal Joints.** Machine run by one man utilizes saws edged with natural diamonds to cut all joints in hardened concrete highways and air-strips. Saw cuts through aggregate, but will not displace it, as some methods will with vibrators.
- 3 **Removing Bumps from concrete runways and highways.** Series of natural diamond wheels smooth concrete surfaces for Concrete Sawing Equipment, Inc., El Monte, Calif.
- 4 **Boring Holes in Concrete.** Portable diamond drilling machine by Wheel Trueing Tool Co., Detroit, cuts holes up to 14 inches in diameter in reinforced concrete, brick, marble, tile.

If you smooth, score or core concrete roads or runways, you can probably use diamonds to advantage. Test them against the method you're using. You'll find out how efficient—and economical—a diamond can be, especially now.

Best grit for metal-bond wheels

A new impact crushing method for natural diamonds (developed by the Diamond Research Laboratory in Johannesburg) is producing the strongest and most durable diamond grit ever obtained for metal-bond wheels. Your tool and wheel manufacturer is ready to help you select the diamond tool that's right for your job.



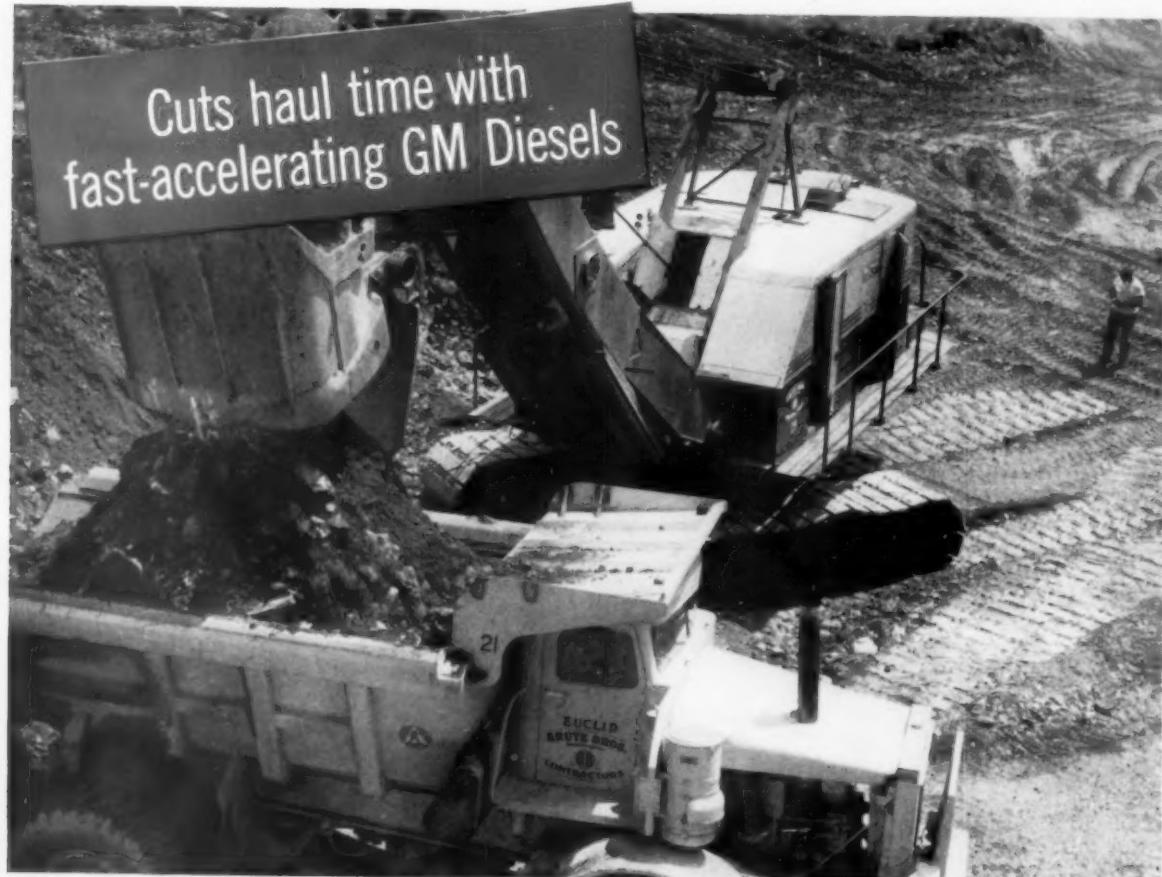
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ROADS AND STREETS, June, 1961

GET REAL PRODUCTIVITY

Cuts haul time with
fast-accelerating GM Diesels



GM Diesel powered Bucyrus-Erie 71B and Euclid Rear Dump, owned by Arute Bros. Inc., at work on relocation of 3-mile section of U.S. 6 near Waterbury, Connecticut.

Ever checked the cycle time on GM Diesel powered equipment when it's running alongside competitive-powered units with the same load?

You seldom need a stop watch to tell you which one's moving faster.

When the "Jimmy" picks up the load it does it *right now!* Power on every piston downstroke lets the GM Diesel grab hold and wind up to governed RPM faster, lopping seconds off every job

cycle, moving more payload per shift. That's why Arute Bros. Inc., New Britain, Connecticut, like their GM Diesel powered Euclid Rear Dumps so well. Here's what they have to say—"We like the fast acceleration of the GM Diesels. They give us better time on the unlevaled haul roads on the project."

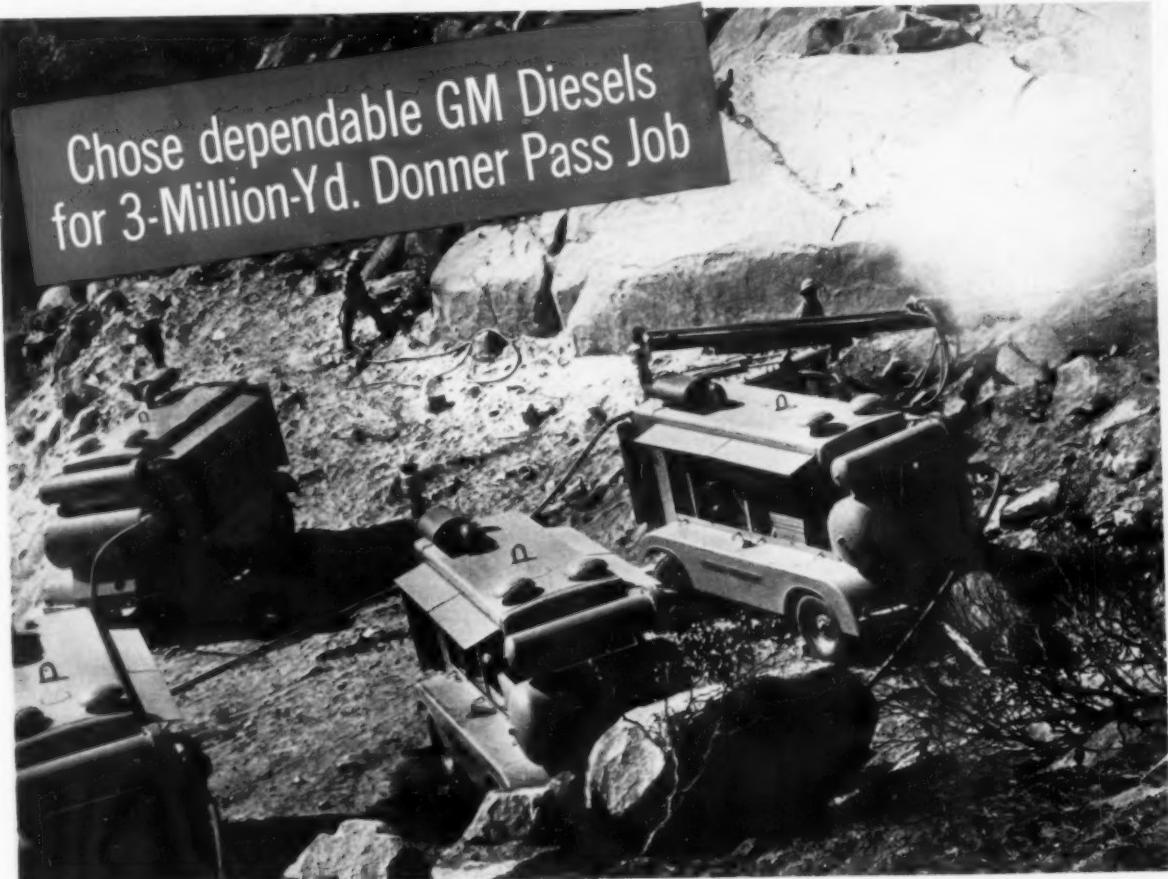
Arute Bros. rely heavily on GM Diesel power—have other "Jimmys" working in compressors, shovels and loaders.

Next time you see GM Diesel powered equipment at work, watch it move. Listen to it pick up the load. Then get the full story. Check on the model for your equipment. New or repower, there's a GM Diesel to fit. Because of wide parts interchangeability, parts cost less, overhauls too. See your GM Diesel Distributor. He's in the Yellow Pages under "Engines, Diesel," or write direct.

GM DIESEL ALL-PURPOSE

GET A GM DIESEL ENGINE

Choose dependable GM Diesels
for 3-Million-Yd. Donner Pass Job



GM Diesel powered Chicago Pneumatic 600 cfm compressors at work for Briggs-Conley-Dennis relocating 7 miles of U.S. 40 near the summit of Donner Pass, California

When you have 3 million cubic yards of mountain to move—and have to work at a 7,000-foot altitude to do it—you need Diesels that will put out, and keep on putting out, with no pampering.

That's why Briggs-Conley-Dennis chose GM Diesels for this job in the rugged Donner Pass area of California's High Sierras.

Earl Blake, project manager on the joint venture, says, "GM Diesel engines were

selected for this equipment because of our past experience with these engines, their known dependability, lower maintenance costs and their greater operating efficiency at high altitude."

Briggs-Conley-Dennis used 15 "6-71" GM Diesel powered Chicago Pneumatic 600 cfm compressors to power their rock drills—16 Euclid 65TD Rear Dumps with "6-110" "Jimmys" on the rock hauls.

How about you? Ready to repower or buy new equipment? There's a GM Diesel to fit your equipment. See your GM Diesel Distributor. He's in the Yellow Pages under "Engines, Diesel." Or write us direct.

POWER LINE

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ROADS AND STREETS, June, 1961

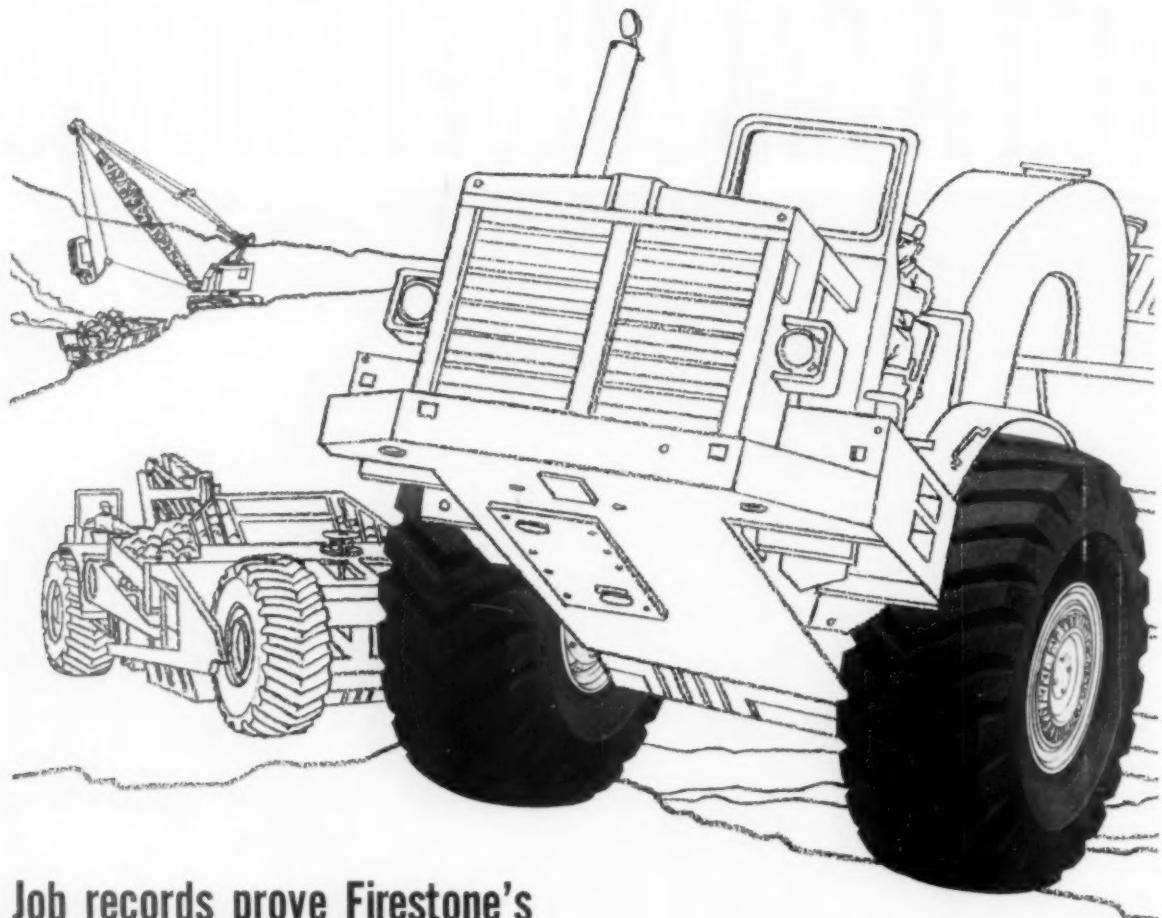
Sets the
standard of
Diesel
productivity



GM
DIESEL

DETROIT DIESEL ENGINE DIVISION,
GENERAL MOTORS, DETROIT 28, MICH.

In Canada: GENERAL MOTORS DIESEL LIMITED, London, Ontario
Parts and Service Worldwide



Job records prove Firestone's
BIG TIRE TEAM KEEPS PRODUCTION UP!

1. **Firestone Giant Tires** keep equipment working to *keep* production up! You get more work out of **ROCK GRIP EXCAVATOR*** tires because far more strength is built into them. Shock-Fortified, *bonus-ply* nylon cord body, teamed with tough cut-resistant Firestone Rubber-X, gives greater staying power to take the worry out of low bids.
2. **Firestone Giant Tire Service:** A Tire Specialist with a completely equipped service truck is on the job to ease deadline pressure, with round-the-clock maintenance for every tire on the project. Put him on the job, and watch your downtime take a dive!

Team up with Firestone cost-cutting Giant Tires and Giant Tire Service. See your Firestone Dealer or Store. Or write: Manager, Off-The-Highway Tires, The Firestone Tire & Rubber Company, Akron, Ohio.

*Firestone T.M.

Always Specify Firestone Tires When Ordering New Equipment.

Firestone

FIRST IN OFF-THE-HIGHWAY TIRE NEEDS

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Washington News Letter

By Duane L. Cronk, Director, Highway Information Services

June 10, 1961

Prospects are good for final passage of the 1961 Federal-Aid Highway Act this month. Senate leadership has no serious objections to the measure adopted by the House last month, the Administration is reconciled to its differences, and the deadline for extension of the federal gasoline tax must be met (June 30).

Meanwhile, the Department of Commerce has released \$818 million in federal-aid two months early, to step up contract lettings. The funds - allocation to the states for the next quarter - will permit many states to expedite planning and construction. Not all states will be affected, however, particularly those which are already ahead of the BPR schedule.

Look for other highway legislation in the House this session to resolve relatively minor, but still controversial, proposals to revise the highway program. For examples: Whether states should be permitted to build any more toll segments to the Interstate System, whether forest road authorizations should be increased, and whether the billboard control feature should be extended another four years. (Only two states - Maryland and North Dakota - have taken advantage thus far of the federal-aid incentive of $\frac{1}{2}\%$ bonus for complying with the federal standards.)

* * *

A plan for volunteer settlement of all labor disputes, other than jurisdictional, has been developed by the Associated General Contractors of America and agreed to by the seven major international unions employed on highway projects. The measure - if faithfully adhered to - will significantly reduce friction in the industry, AGC believes.

Jurisdictional disputes are currently being settled under procedures established by the National Joint Board for settlement of Jurisdictional Disputes. An estimated 50% of the labor disputes which lead to work stoppages are not jurisdictional, however, and could be resolved under the new plan. It provides for quick settlement by local efforts and spells out methods of carrying disagreements to a national Joint Appeals Board.

AGC leadership is optimistic about the effectiveness of such machinery for preventing long and costly strikes. A team of seven major contractors and the association's labor relations staff have been working on the plan for several years, and negotiating with the unions involved - bricklayers, teamsters, operating engineers, hod carriers and laborers, iron workers, cement masons, and carpenters. Highway contractors have been forced into increased negotiation with such organized forces within recent years, and are inheriting many of the difficulties heretofore common mainly to building construction.

(continued on next page)

A general step-up in committee activities of the American Road Builders Association is expected to lead to solution of a number of other industry problems. During the next few months, for examples, contractor members will:

Investigate rather closely President Kennedy's suggestion that tax credits for equipment purchases may be a good method of stimulating business expansion. If the idea makes sense, as far as highway contractors are concerned, ARBA may take specific recommendations to the Administration or Congress.

Drive for agreement with the American Association of State Highway Officials on specifications reforms. Both AASHO and the Bureau of Public Roads are in accord that construction specifications need to be periodically re-studied by state highway departments and re-written to permit use of modern equipment. AASHO and ARBA are working toward establishment of a new Committee on Equipment to explore this area. ARBA is bothered, also, by the lack of uniformity among the states on what appear to be basic grading and paving specs. As contractor organizations grow and an increasing number become capable of bidding in more than one state, this becomes a source of irritation and uncertainty to them.

"I think the time is coming," "Capt." C. D. Curtiss, former commissioner of the SPR and now an ARBA official, believes, "when contractors will be working under a minimum of instructions concerning methods. Highway officials are - and should be - more and more concerned about end results, instead. This change in thinking may be accelerated by the development of very rapid methods of making on-the-job tests as much as anything else."

Devise a new project safety program. The Contractors Division is working out details with the National Safety Council for a program to satisfy contractor interest in accident prevention methods.

* * *

The U.S. General Accounting office is continuing to turn out reports critical of state highway department administrative procedures. Last month it pointed the finger at the District of Columbia for:

Failing to bill the federal government for all the costs incurred in federal aid projects. (On two jobs, the GAO claims, the District failed to take credit for some \$300,000 worth of preliminary engineering work.)

Giving too much work to consultants instead of performing it with its own staff. (Both the state highway departments and the consulting profession have lashed back at the GAO previously for this kind of criticism. The federal accountants are not good judges of how much engineering a department should or should not handle internally, they say.)

Not correlating scheduling of the work of contractors and thereby provoking delays and increased construction costs.

* * *

Contractors in western states who tackle federal highway projects will be interested in the new standard specifications just released by the Bureau of Public Roads. A number of changes have been adopted, for examples, thicknesses with tolerances are now to be shown for all pavement items; the use of diesel hammers is permitted for pile driving, and the radiograph method of checking welds in steel structures is recognized. The manual may be of interest to specification writers of other highway agencies, as well as the industry.



**MORE JOB
VERSATILITY** **LOWER
OPERATING COSTS** **WITH THE
'EUC' C-6**

The background consists of a grid of the word "EUCLID" repeated in a staggered pattern. Overlaid on this grid are two circular images: one on the left showing a silhouette of a person standing on a triangle, and one on the right showing a bulldozer operating in a quarry.



C-6 LOWEST COST

Saves time and labor . . .

Job proved components and unsurpassed accessibility for day-to-day maintenance, as well as major repair work, keep downtime and operating costs to an absolute minimum. There's a big difference between the C-6 and its closest competitor . . . for example:

Service accessibility . . .

Fast, easy access to major components cuts repair and replacement labor.

- **save 7 hours on radiator replacement**
- **change a drive sprocket 5 hours faster**
- **17 hours saved on recoil system replacement**
- **engine replacement in 6 hours less**

These are typical times for removal and replacement without the prior removal of any integral components . . . think what these savings in time and labor can mean in lower operating costs and increased productive work time!

Power train . . .

Proven components . . . GM 6-71 engine, Allison Torqmatic Drive and Euclid planetary final drive . . . dependable, efficient and balanced, it delivers more of the rated engine horsepower to the drive sprocket than any comparable power train . . . and parts and service are readily available to owners everywhere!

Lower cost engine parts . . .

Individual engine parts, such as pistons, rings, liners and connecting rods, are up to 72% less in cost than for more limited production engines . . . a fan-to-flywheel engine replacement costs only one-half to two-thirds as much in the C-6!

See a "EUC" C-6 at work and see the big difference that pays off in lower cost!



TRACTOR IN THE 200 H.P. CLASS

...and the most versatile, by far



DOES MORE WORK...and a better job on more kinds of work

Because the C-6 is the most versatile crawler in its class, it's a more productive tractor. Matched power train...full-power shift...fast-as-a-fox response...better balance with any attachment...and easy operation...these are features that enable the C-6 to handle more work better and more efficiently.

When it comes to over-all productivity...on all kinds of tractor work...the "Euc" C-6 has earned a reputation for remarkable performance. Owners and operators alike report that it has more versatility and is more useful for a wide range of work from side sloping to the heaviest dozing and ripping.

You really have to see a C-6 at work to see what this versatile crawler can do in getting more work done... cutting costs and protecting your profits!



'EUC'C-6 VERSATILITY CUTS CRAWLER COSTS

No other crawler in its class can do so many jobs so well at such low operating cost . . . no wonder this Euclid is the talk of crawler users everywhere!



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DIVISION OF GENERAL MOTORS, HUDSON, OHIO
Plants at Cleveland and Hudson, Ohio and Lanarkshire, Scotland

People

Womack Heads WASHO

J. C. Womack, state highway engineer of California, was elected president of the Western Association of State Highway Officials during the association's annual conference, Las Vegas, April 23-28.

W. O. Wright, state highway engineer of Nevada, was elected vice-president, and Forrest Cooper, deputy state highway engineer, Oregon, secretary-treasurer. Executive committee members elected were Ernest Ketcham, Washington; Arval L. Anderson, U. S. Forest Service, Montana; J. J. Marsh, Colorado; C. Taylor Burton, Utah; G. Bryce Bennett, Idaho.

Earl F. Kelley Passes

Earl Foster Kelley, formerly Chief of the Division of Physical Research, Bureau of Public Roads, died recently. He had retired in 1956 after 36 years of Federal service.

Mr. Kelley was widely known for his scientific accomplishments and his leadership in research in materials, methods of design and construction of highways and bridges. He was the author of an extensive list of research study reports, both as an individual and as a member of committees of numerous national organizations.

Mr. Kelley was a chairman or member of important working committees of such organizations as the ARBA, AASHO, HRB, AAPT (president and ASTM). He received ASTM's award of merit for distinguished service; also in 1954 the U. S. Department of Commerce gold medal for contributions of outstanding value in the development and advancement of highway engineering; in 1956, the Highway Research Board's Roy W. Crum Award for Distinguished Service.

LINDELL D. HALE, formerly district airport engineer, Federal Aviation Agency, has joined the consulting firm of Clyde E. Williams & Associates, Inc., Indianapolis. He will be a company director and in charge of the firm's airports and aviation division.

Continued on page 27

NEWS FROM FLINTKOTE:

SPECIALLY DESIGNED PAVING PRODUCTS

**For sealing joints,
For surface sealcoating,
For concrete bonding,**

ASK FOR FLINTKOTE ENGINEERING DATA SHEETS ON:

M-200: Fast setting, polymer type joint and crack sealer for concrete pavements—cold applied. Offers best resistance to jet aircraft heat and blast operations under wide temperature variations. Meets Interim Fed. Spec. SS-S-00200a.

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FLINTSEAL® (Regular—SS-S-164) and (Jet Fuel Resistant—SS-S-167b): rubber bearing, hot-poured types for durable sealing of joints and cracks to prevent leaking and provide resistance to wear under repeated freeze-thaw cycles. Meet Fed. Spec. for both types.

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FLINTCRETE*: Polysulfide/epoxy compounds (grout and binder) for bonding old and new concrete in restoration and repair of pavements and structures, bonding curbs, traffic markers, skid-proofing and many other adhesive requirements. Procedures fully detailed.

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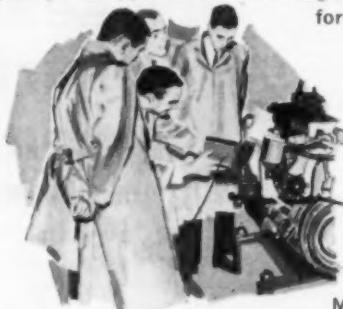
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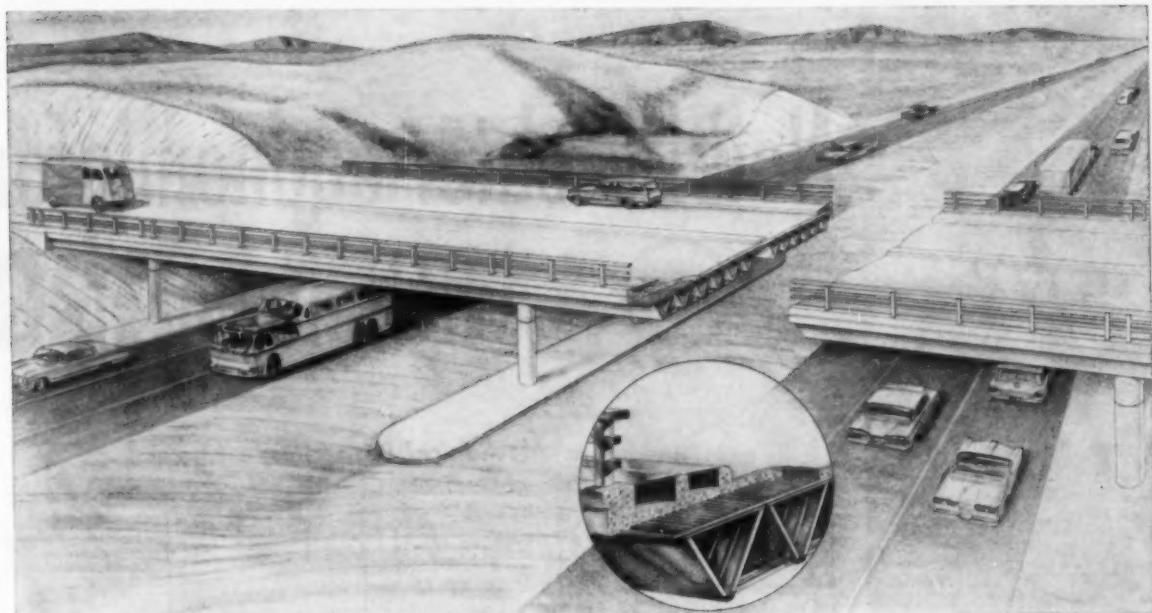
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Completely new type of highway bridge, of aluminum cellular components, being completed on a Long Island express highway project.

Making Commercial Bow: Prefab Aluminum Bridges

Two aluminum highway bridges being built at Amityville, Long Island, will be the first to utilize an aircraft-type, stressed-sheet design. They mark the entry of Kaiser into the manufacture and distribution of pre-fabricated aluminum components for bridge construction.

The Kaiser Aluminum Unistress Bridge, so named, is technically a semi-monocoque structure composed of triangular shaped beams bolted together edge-to-edge to form a roadway base. Each "cell" is shop-fabricated from sheet, and stiffened inside with aluminum extrusions for maximum strength per pound. The concrete paving is integrally tied in with the metal components.

A pound of aluminum in the bridge does the work of 4 to 6 lb. of steel in a conventional bridge, the exact ratio depending on dimensions and design factors, according to R. L. Sheneman who heads the Kaiser program. The new Unistress bridge meets design criteria of the Bureau of Public Roads and is reported to be competitive pricewise with conventional steel when spans are 75 ft. or more.

Under the name of the Fairchild
Continued on page 34

NOW AVAILABLE HOT OIL HEAT ANYWHERE WITHOUT ELECTRIC POWER

Gasoline
Engine Drive

•
Completely
Self-Contained



Manually
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Operates Anywhere
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Childers LOG-26 Circulating Hot Oil Heater

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- Price \$2175 FOB Albuquerque, New Mexico
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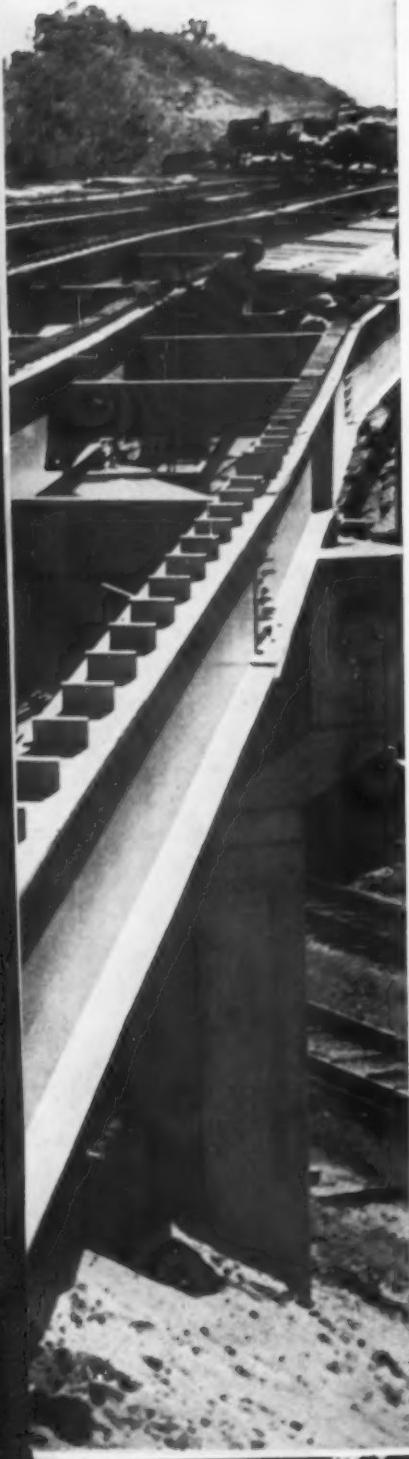
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Now! Greater economy for with new A36



Mechanical Properties

	A7	A373	A36
Yield Point, min. psi	33,000	32,000	36,000
Tensile Strength, psi: For shapes of all thicknesses	60,000 to 75,000	58,000 to 75,000	60,000 to 80,000
For plates and bars. Up to 1½ in., incl., in thickness	60,000 to 72,000		
For plates and bars over 1½ in., in thickness	60,000 to 75,000		
Elongation in 8 in., min., per cent	21	21	20
Elongation in 2 in., min., per cent	24	24	23

Chemical Requirements

	SHAPES		BARS		PLATES		
	C max.						
A7	...	...	...	...	...	...	...
Mn. . . . .	...	...	...	...	...	...	...
Si. . . . .	...	...	...	...	...	...	...
			¾ in. & under	Over ¾ in. to 4 in.	¾ in. & under	Over ¾ in. to 1½ in.	Over 1½ in. to 4 in.
A36			.28	.28	.28	.28	.28
C max.	.28		.28	.28	.28	.28	.28
Mn. . . . .	...	...	...	.60/.90	...	.80/1.10	.85/1.20
Si. . . . .	...	...	...	...	...	...	.15/.30
	Other than Group A	Group A heavy W.F.	1 in. & under	Over 1 in. to 4 in.	½ in. & under	Over ½ in. to 1 in.	Over 1 in. to 2 in.
A373	.28	.28	.28	.28	.26	.25	.26
C max.	.28	.28	.28	.28	...	.50/.90	.50/.90
Mn. . . . .	...	.50/.90	...	.50/.90	...	...	.15/.30
Si. . . . .	...	...	...	...	...	...	.15/.30

BETHLEHEM STEEL

steel bridges and buildings structural steel!



for strength
... economy
... versatility

- Adopted by the ASTM on June 16, 1960
- Recognized by the A.I.S.C.

ASTM Specification A36 covers carbon steel shapes, plates, and bars of structural quality not over 4 in. in thickness for use in the construction of bridges and buildings, and for general structural purposes.

10 PER CENT STRONGER THAN A7 AND A373

A36 has an increased yield point of 36,000 psi, and is approximately 10 per cent stronger than A7 and A373. The higher yield point of A36 allows increased design stresses using the same factors of safety.

CONTROLLED CHEMISTRY ASSURES WELDABILITY

A373 has been generally specified for welded construction of bridges and buildings. The chemical requirements at left indicate how closely A36 agrees with A373 in chemistry and, therefore, in weldability. Where weldability is required, the controlled chemistry will permit the use of A36.

INCREASE IN YIELD POINT SAVES WEIGHT

The substantial increase in yield point for A36 makes it a real bargain in strength-to-weight ratio at a very nominal cost. The weight saved by designing with A36 steel will result in even greater economy for steel construction.

A36 IS AVAILABLE IN ALL SIZES AND SHAPES

A36 can be furnished from the same schedules and in all sizes and shapes in which A7 and A373 are rolled.

FOR MORE INFORMATION on new A36 steel, write for Folder 773, and Booklet 569. Or get in touch with the Bethlehem sales office nearest you.



BETHLEHEM STEEL COMPANY
BETHLEHEM, PA.

Export Sales: Bethlehem Steel Export Corporation

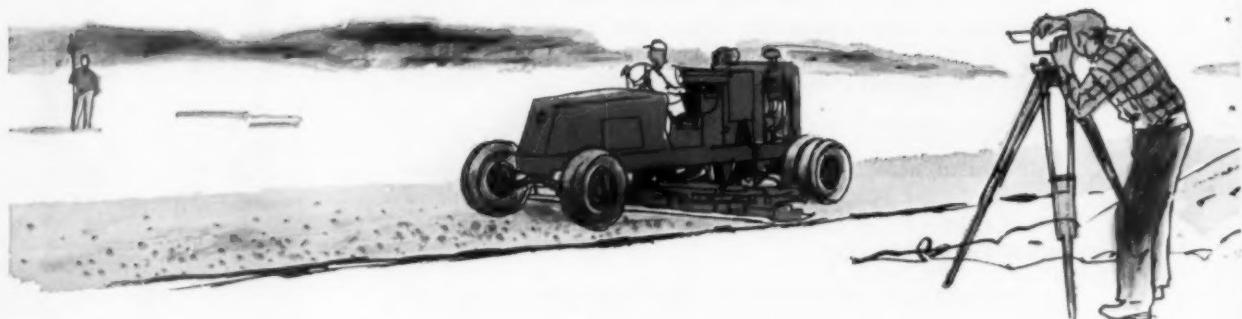
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WHY PROFITS SOAR WHEN LIMAS DIG!



Lima pullshovels are unsurpassed for trenching and basement excavations. Easy operating, accurate for close limit work; cut square corners, straight side walls; maintain trench bottom grades.

With each cycle, deep-digging Lima camelback booms add another mite of profit to your pocket. Because they dig, and they dig, and they dig . . . virtually without stopping. That is what they are designed and built to do. We can tell you about flame and induction hardening of wearing parts, of antifriction roller bearings, of machine-cut gears and so on—but it all boils down to traditional Lima quality. The kind of quality that lays maintenance costs bone-bare and keeps machines on the job, day after day, steadily dipping and digging dollars for you.

Like proof? Why not ask our distributor nearest you—or write to us here in Lima.

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CAPACITIES

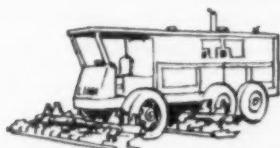
CRAWLER MOUNTED PULLSHOVELS—to 4½ cu. yd.; truck mounted to 1¼ cu. yd.

CRAWLER MOUNTED SHOVELS—½ to 8 cu. yd.

CRAWLER CRANES—15 to 140 tons

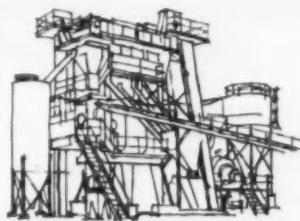
TRUCK CRANES—20 to 80 tons, boom-jib combinations to 250 ft.

WAGON CRANES—20 to 75 tons



LIMA SUPER ROADPACKER—

Twelve vibrating shoes consolidate fast, deep for profitable single-course construction; available in 6-shoe Model D.



LIMA MADSEN ASPHALT PLANTS

—available in models with batching capacities from 1000 to 10,000 lb.



LIMA AUSTIN-WESTERN portable

and stationary crushing, screening and washing equipment; including jaw crushers, feeders, screens, elevators, conveyors, bins.

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ROADS AND STREETS, June, 1961



WYOMING

Highways make headway with B.F. Goodrich



FOUR-LANE WHEATLAND-GLENDÖ FREEWAY takes shape as fleet of Woodward Construction Co. scrapers on B.F. Goodrich Rock Service tires move 960,000 cubic yards of rock and dirt. Note the BFG Servicemobile. It's fully equipped with the latest power tools to handle tires—and trained BFG tire men are always on call to make fast, expert tire repairs. Service like this can make the difference between profit and loss on a job.

TEXAS

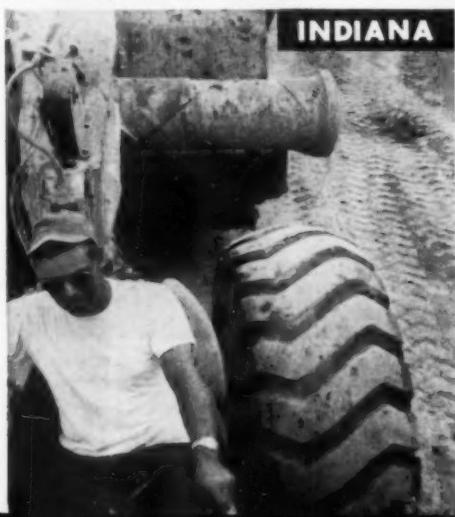


BUILDING U.S. HIGHWAY 59 calls for a fleet of earthmovers to wind over sandy soil hauling 30-ton loads of fill dirt. Because flotation and traction are "musts," Williams Bros. Construction Co. chooses B.F. Goodrich Super Traction tires. Note the wide, flat tread—the sharp, deep cleats. The BFG Flex-Rite Nylon cord construction has twice the strength of ordinary materials, resists heat blowouts and flex breaks. It's not unusual for BFG tires to be retreaded again and again.

DOLLAR-SAVING B.F.GOODRICH TIRES AND SERVICE
SPEED HIGHWAY CONSTRUCTION
ALL AROUND THE COUNTRY



SCRAPER HAULS 30 TONS OF DIRT, works 60 hours a week to speed construction of Interstate Highways 65 and 465. BFG Rock Service tires give 4,000 hours' service. Contracting-Material Co. reports, can still be retreaded. One reason: B.F.Goodrich Flex-Rite Nylon cord construction.



THE NEXT TIME your bid gets the nod, take a tip from highway contractors in every corner of the country and have a talk with your B.F.Goodrich dealer. He can help you so many ways. With tires for every vehicle on the road (or in the rough) built with such BFG specialties as Flex-Rite Nylon cord construction, Cut Protected and Heat Resistant compounds. With BFG conveyor belting, V-belts, hose, protective clothing. With BFG steel toe, steel insole safety boots. With on-the-job service that keeps you on the go. With friendly, knowledgeable advice that helps keep costs low. No matter what the job or where, you'll make headway easier and faster with B.F.Goodrich. Your nearby dealer is listed under Tires in the Yellow Pages.

The B.F.Goodrich Company, Akron 18, Ohio.

Specify

B.F.Goodrich Tubeless
or tube-type tires
when ordering
new equipment

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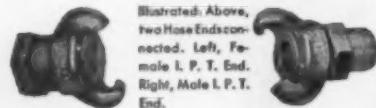
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Quick-Acting, Universal

HOSE COUPLING

FOR COMPRESSORS, ALL TYPES OF AIR TOOLS, WATER, OIL AND SPRAY SERVICE

This versatile coupling is built along plain, rugged lines to assure long, trouble-free service under severest working conditions.



Illustrated: Above, Two Hose Ends connected. Left, Female I.P.T. End. Right, Male I.P.T. End.

The "Air King" will reduce operating costs wherever quick connections are required. Locking heads are identical for all sizes of hose or threaded ends, permitting the coupling of any two sizes of hose within the "Air King" hose end size range, or coupling to any pipe up to 1" by use of the male or female threaded ends. Heads are locked by pressing together and applying a quarter-turn. A patented Safety Locking Device eliminates all risk of the coupling coming apart. Available in bronze or rustproofed malleable iron, in sizes up to 1".

The "Air King" is made to established standards for couplings of this type and is interchangeable with other similar makes.

Also available in 4-Lug style, Hose and Female I.P.T. Ends only, in 1½", 1¾" and 2" sizes.

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EXPORT DEPARTMENT
1010 SCHAFF BLDG.
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ALUMINUM BRIDGES

Continued from page 27

Aluminum Bridge, a prototype underwent tests in 1958 by Lehigh University's Department of Civil Engineering. These tests established the ability of such a structure to withstand long service.

Harry J. Kahn, an inventor of the system and designer of the Amityville structures, is now with Kaiser as a consultant. He explains that all of the assembled triangular beams of a Unistress bridge work together in supporting a wheel load, the entire deck functioning as a single member. The aluminum sheet forming the roadway base has corrugations running the length of the bridge, enhancing strength and

eliminating need for deck forms.

The structural units involved lend themselves to mass production, and can be easily transported to job sites. Because the units are assembled with lockbolts, installation can be speedy.

The two identical structures in Amityville each measure 212 ft. long by 85 ft. wide, with four spans made up of 76-ft. and 30-ft. beams. A total of 376,000 lb. of 6061-T6 alloy aluminum sheet, plate and extrusions are involved.

Austin M. Sarr, district engineer at Babylon, is supervising the work for the New York department of public works. Century Psaty-Columbus is the contractor for the Sunrise Highway Extension and Conduit Boulevard projects on Long Island which take in these bridges.

Lighter, Stronger Bodies, Bigger Pay Loads

Contractors who use rear-dumps or bottom-dumps for earth and rock hauling may find it worth while to watch the experience with the haulers here pictured. They were built to help make Minnesota iron ore mining more competitive. U. S. Steel's Oliver Iron Mining Division specified a new high yield strength steel for these truck bodies, in an effort to increase the payload of its mine haulage by reducing dead weight.

The new material USS "T-1" steel, will permit trucks to carry more ore in proportion to overall weight. Oliver engineers hope that resultant cost saving will assist in improving the cost-quality relationship of Minnesota ore, in competition with higher quality ore from other sources. The weight-saving for the ore trucks permits a 45-ton payload instead of 40 tons possible with previous designs.



An added 5 tons of payload per truck is made possible by use of higher-strength, lighter-gauge "T-1" steel construction in dump bodies.



Geared by FULLER

The Hammersley Construction Company of Madison, Wisconsin is fulfilling its contract to move 2,500,000 yards of dirt in the construction of three Badger State highway interchanges with scrapers equipped entirely with Fuller Transmissions.

2½ Million Yards of Earth Moved by Fuller-Geared Scrapers

Hammersley Construction Company is heap-loading on fast work cycles with one Allis-Chalmers TS 360 geared by a Fuller 5-speed 5-G-1520 Transmission, eight LeTourneau-Westinghouse Model B Tournapulls—all geared by Fuller L-1550 10-Speed Transmissions—and seven Model C Tournapulls equipped with Fuller L-1220 Transmissions.

"We've used Fuller Transmissions in our scrapers for some time," states Fay Hammersley, Jr., owner of the company, "and we've had good results with them. On any new equipment, I'll specify Fuller."

Models 5-G-1520, L-1220, and L-1550 Transmissions are equipped with air-powered Countershaft Inertia Brakes for quick up-shifts, and

with Fuller Pressure Lubrication and Filtration Systems to provide positive lubrication, maintain clean oil, and greatly prolong gear and bearing life.

For easier, quicker shifts with engines operating in the peak horsepower range, lower fuel consumption, and GREATER PROFITS in your earth-moving operations . . . specify Fuller Transmissions.

FULLER TRANSMISSION DIVISION
EATON MANUFACTURING COMPANY 
KALAMAZOO, MICHIGAN

Sales & Service: West. Dist. Branch, Oakland 6, Cal. • Southwest Dist. Office, Tulsa 3, Okla. • Automotive Products Co., Ltd., Brock House, Longham St., London W.1, England, European Rep.

... for more details circle 302 on enclosed return postal card

NOW—with the

Scout®

**ONLY INTERNATIONAL offers you
such a wide range of
all-wheel-drive trucks**

From this tough little all-weather handyman to giants with 73,000 lb. GVW rating, INTERNATIONAL gives you today's most complete construction team! And INTERNATIONAL is in a class by itself for keeping you on schedule, too. A vast, nation-wide network of sales and service centers, plus 12 major parts depots, *makes sure of it*. Look at this line-up:



Always on the job: INTERNATIONAL model C-120(4x4) takes you in before the roads are in! GVW rating up to 7,000 lbs. This powerhouse has all-wheel bite and the famous INTERNATIONAL V-8 engine (6-cylinder and another V-8 model optional). Big 8½-foot box lets you bring along the whole construction shack on the first trip. Eight and 9-foot platform and stake bodies optional.



Grading, hauling, backfilling or blade-work: Versatile INTERNATIONAL model BC-180(4x4) can work any part of the job. This compact-design truck maneuvers easily in tight working conditions. Both front and rear have power take-offs to deliver INTERNATIONAL's full V-8 authority where you want it. Gasoline or LPG 6-cylinder engine optional, GVW rating up to 20,000 lbs.



Moving a 10-yard load of rock: Rugged INTERNATIONAL model RF-190(6x6) has the power and traction to do it—out from under the shovel and back on the road without bogging down. It will perform under the most foul weather conditions. Six-cylinder engines up to 212 hp., GVW rating up to 43,000 lbs.



Transit-mix with traction to spare: A bear for work off the road, the INTERNATIONAL model RF-210(6x6) chassis will take that transit-mix load anywhere. Rated up to 52,000 lbs. GVW, now it offers you all the advantages of new INTERNATIONAL live-tandem bogie. Six-cylinder engines up to 212 hp., power steering optional.

Need a dump truck right away? INTERNATIONAL will have one ready in 24 hours! Six-wheeler or single axle, your nearby INTERNATIONAL Truck Dealer or Branch can ship you

the truck you select from their special Truck Sales Processing Center. It's one more example of the service INTERNATIONAL provides, to keep your job on schedule.

INTERNATIONAL® TRUCKS

WORLD'S MOST COMPLETE LINE
Motor Trucks • Crawler Tractors • Construction Equipment

International Harvester Company, Chicago
• McCormick® Farm Equipment and Farmall® Tractors





Off-road workhorse, hardtop pickup . . . you can count on the new, low-cost SCOUT to whip you out to the job site and back comfortably, economically. The SCOUT carries three men in the enclosed all-steel cab, hauls hefty loads in the 5-foot box. It strips down for even faster action, too—roof, doors and windows are removable in minutes, windshield folds down. Powered by tough, new INTERNATIONAL 4-cylinder COMANCHE engine to save you gas. Ask your SCOUT Dealer for full details now.

... for more details circle 318 on enclosed return postal card

ROADS AND STREETS, June, 1961

no sweat, no strain

with Speed-o-Matic power-hydraulic controls



Pinpoint control . . .

SHORT-THROW POWER CONTROLS
insure safe, accurate shovel-crane operation,
beat fatigue, boost production

Speed-o-Matic is not an air, partial booster or mechanical system. Basically, it's the same precise power-hydraulic control system you find on aircraft, machine tools, farm equipment — your own family car if it has power-brakes or steering.

On a Link-Belt Speeder the true power-hydraulic controls govern all fundamental shovel-crane opera-

tions — booming, swing and travel, load lowering/hoist and steer. To slip the machine into action you merely nudge short-throw control levers. Response is instant and smooth; no delay for pressure build-up . . . no jump . . . no snap.

Ask any Speed-o-Matic operator. He'll tell you it's the most fatigue-free, productive system he's ever worked . . . and the safest too! Speed-o-Matic lets him spot loads with pinpoint accuracy, lets him maneuver with wrist-action simplicity, lets him concentrate on the job, not the machine.

Speed-o-Matic power-hydraulic
controls are standard on the
entire Link-Belt Speeder line





Easy maintenance . . .

HYDRAULIC SYSTEM PRACTICALLY MAINTENANCE-FREE — Speed-o-Matic clutches automatically compensate for heat and normal lining wear

The Speed-o-Matic hydraulic system requires no priming or bleeding — only routine seasonal oil changes. There are no bushings, pins, links, clutch toggles. The actuating mechanism is oil-immersed. A micronic-type, replaceable filter keeps oil clean.

Interchangeable Speed-o-Matic clutches require little operator attention. Hydraulic-actuated cylinder

pistons compensate automatically for normal lining wear, heat expansion or weather changes. There are no nuisance adjustments.

Twenty-five years of hydraulic manufacturing experience backs Speed-o-Matic; Link-Belt Speeder introduced the system in 1936. It is a modern product of the finest hydraulic shop in the shovel-crane industry. And all components (except pump) are made by Link-Belt Speeder. Get the complete Speed-o-Matic story from your distributor. Or write Link-Belt Speeder Corporation, Cedar Rapids, Iowa. 107-61N

LINK-BELT SPEEDER



21 crawlers

6 truck cranes

4 self-propelled

It's time to compare . . . with Link-Belt Speeder

... for more details circle 326 on enclosed return postal card

ROADS AND STREETS, June, 1961

ONLY MAGINNIS

VIBRATING ATTACHMENTS



FOR YOUR PAVING MACHINES

**GIVE YOU
THESE - -
Plus BENEFITS**



Maginniss Hi-electric motor-in-head Vibrator design insures cooling of motor by surrounding concrete.

Induction type motor maintains constant speed under load. No brushes or commutator; spark-free — It is simple to maintain.

Motor drives eccentric direct — No flexible shaft.

Spacing, angle, depth and frequency are completely adjustable by the prime machine operator—to meet any and all conditions.

The unit mounts easily on any spreader, finisher, combination spreader-finisher or slipform paver without changing its balance or movability.

The generator is smaller in size and weight than that required to operate series-motor vibrators. It takes up less room on the machine.



WHERE TO USE THEM:

City Concrete Paving
State Highway Paving
Airport Runway Paving
Highway Widening
Canal Spillways



MAGINNIS
POWER TOOL CO.

154 Distl Avenue, Mansfield, Ohio



FIND YOUR NEAREST DISTRIBUTOR IN THE YELLOW PAGES
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Publications

SUGGESTED GUIDE FOR FIELD COST ACCOUNTING FOR BUILDING CONTRACTORS. Published by the Associated General Contractors of America, 20th and E Streets, N.W., Washington 6, D.C. The cost is \$2.50 a copy; \$1.25 for AGC members. Intended to be adapted to circumstances, but emphasizes the importance of using some well-defined procedures and systems. Spurred by the relatively high rate of business failures in the construction industry, the AGC developed the booklet after consulting executives of some 80 leading AGC building contracting companies about their cost accounting forms.

BALTIMORE-WASHINGTON INTER-REGIONAL STUDY—LAND USE AND TRANSPORTATION. Technical Report No. 7, Baltimore Regional Planning Council and National Capitol Regional Planning Council. This 123-page report dated November, 1960, contains data of value to planners and administrators.

COMPILATION OF ASTM STANDARDS ON CEMENT. 1960 edition. 288 + VIII pages. \$4.00. American Society for Testing Materials, 1916 Race St., Philadelphia 3, Pa.

This reference volume contains 8 specifications, 26 methods of test and several definitions. Two specifications for laboratory apparatus are also included. Methods added to this publication since the previous edition include: flase set of portland cement (paste method), fineness of hydraulic cement by the No. 325 sieve, and potential sulfate resistance of portland cement. Revisions have been made in 4 specifications and 8 methods retained from the previous edition and also in the definitions. Changes and additions have been made in the appended Manual of Cement Testing and Selected References on Portland Cement.

HIGHWAY FACTS. Better High-
Continued on page 48

Step up your TRACTOR LOADER

Performance
Operator comfort
Wearability
Ease of maintenance
Reliability



WITH ALLIS-CHALMERS

Here's a project geared to the demanding standards of today's earth-moving men... bringing them the benefits of Allis-Chalmers' massive research and development in the form of significant product improvements. Here, for example, is some really special news about tractor loaders.



Performance
Operator comfort
Wearability
Ease of maintenance
Reliability

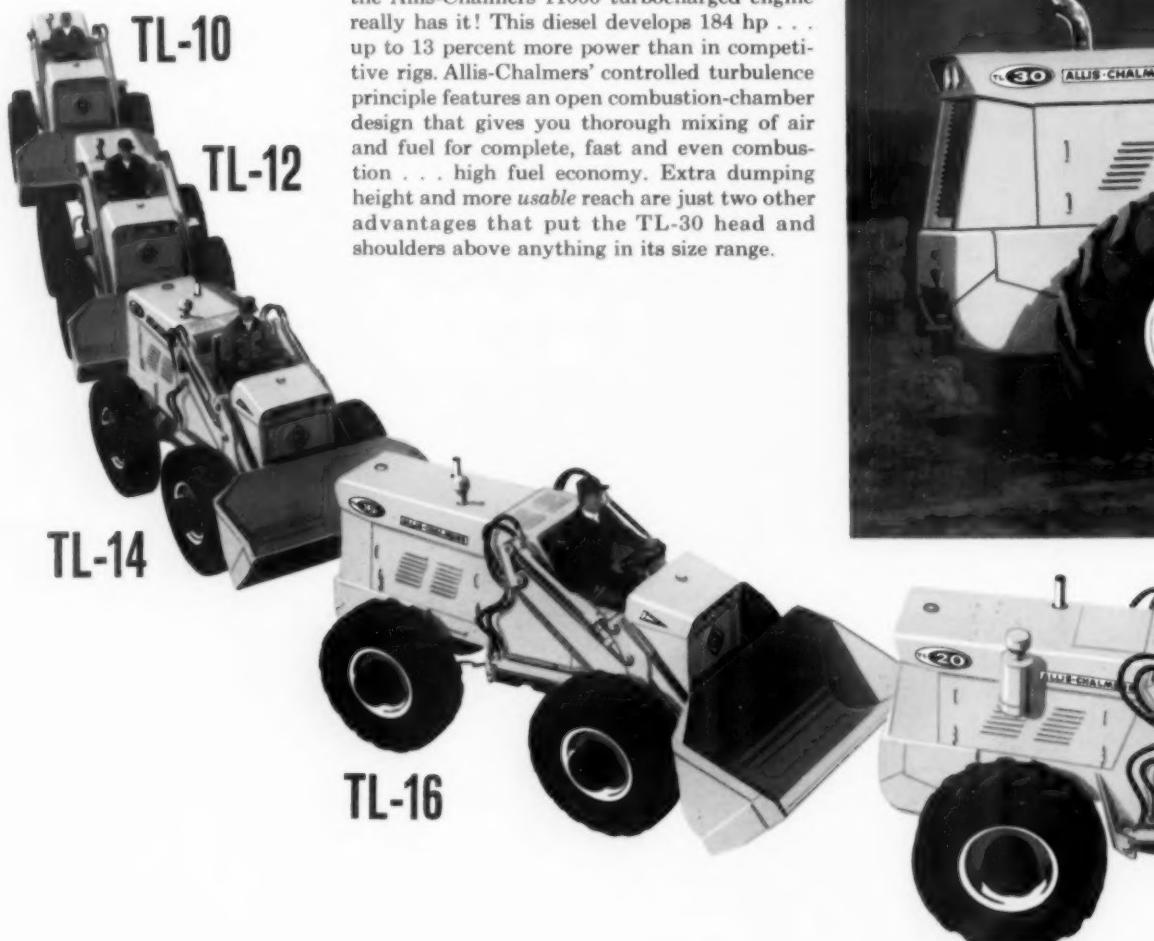
ANOTHER BIG TRACTOR JOINS THE ALLIS-CHALMERS

a line designed to help you set new production records . . .

184-HP TL-30

Here's extra power and capacity to step up your production, excavating, hauling and dumping. The TL-30 gives you all of the basic performance advantages that have earned Allis-Chalmers loaders wide acceptance around the world.

You'll go for the TL-30's new 10,500-lb carry capacity . . . up to 16 percent more than others in its class. When it comes to economy, the Allis-Chalmers 11000 turbocharged engine really has it! This diesel develops 184 hp . . . up to 13 percent more power than in competitive rigs. Allis-Chalmers' controlled turbulence principle features an open combustion-chamber design that gives you thorough mixing of air and fuel for complete, fast and even combustion . . . high fuel economy. Extra dumping height and more *usable* reach are just two other advantages that put the TL-30 head and shoulders above anything in its size range.



3,600 to 10,500-lb carry capacity • 1- to 6-cu-yd buckets • 77 to 184 hp

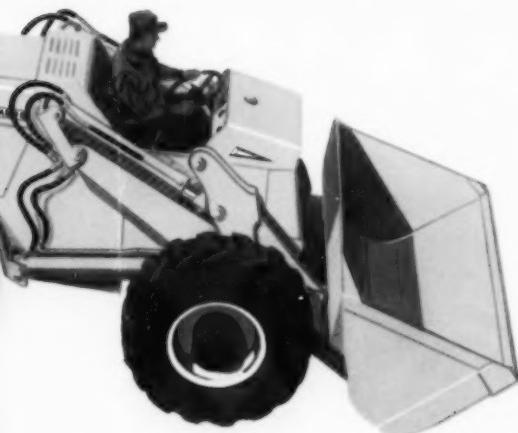
TL-20

TRACTOR LOADER CHALMERS LINE . . .

. . . whatever your over-all job requirements.



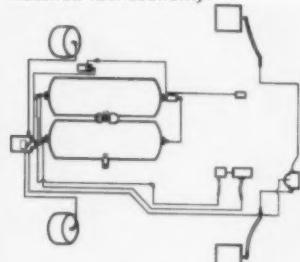
TL-30 10,500-lb carry capacity
2½- to 6-cu-yd buckets
Weight: 28,400 lb



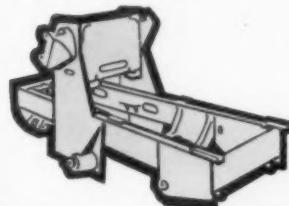
*There's more
to this important
TRACTOR LOADER
STORY
turn the page...*



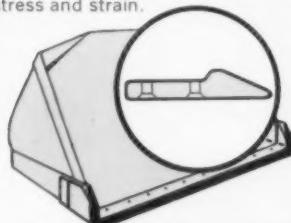
11000 turbocharged diesel engine—conservatively rated at 184 hp. One of the healthiest lines of engines in the business, with unmatched fuel economy.



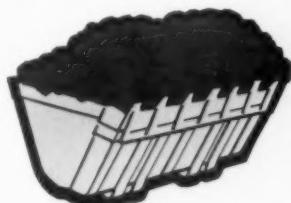
Safe, sure braking power—four-wheel air brakes let you work with confidence even on the steepest grades or stockpiles.



Full box frame—high-strength steel provides a solid backbone for the tractor loader . . . soaks up stress and strain.

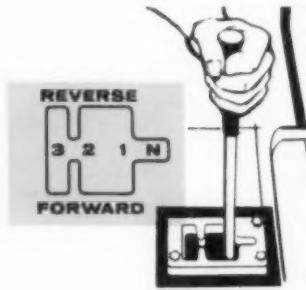


ARROWHEAD cutting edge—provides added strength and protection for the bucket bottom and sides . . . extends service life.

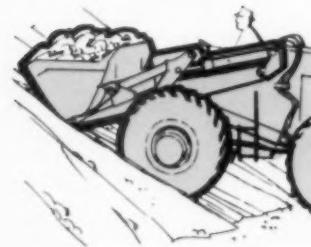


10,500-lb carry capacity—gives the TL-30 as much as 1,500 lb more carry per bucket load than others of comparable size.

Full command in the palm of your hand—with single-lever control. You go into and out of any speed, forward or reverse, with just a quick movement of the lever. Operators work at peak capacity all day long.



These important features
AVAILABLE TO YOU
... exclusive built-in Allison transmission.



Ideal dump cylinder location—up and away from dirt and grit that scores piston rods... damage vital hydraulic components. And, because cylinders are not attached directly to the bucket, there's less dead weight and more "pay" weight.

Production-boosting attachments—special buckets, lift forks, crane hook, backfiller blade, bucket teeth, ripper, log tongs, long booms.

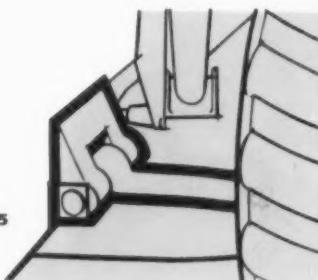
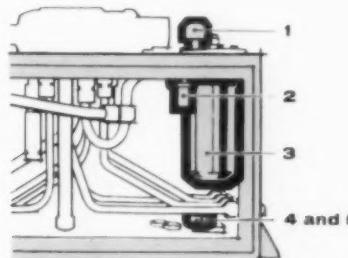
of your
rol. You
forward
x move-
work at

Extra lift and reach—brings fast, smooth loading of high side-boarded trucks. The TL-30, for instance, offers 10' 4½" of dumping clearance . . . a foot or more extra lift than others of this size.



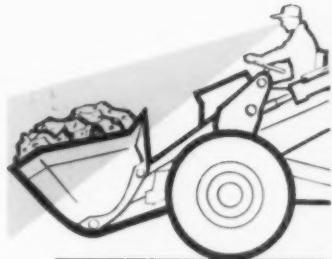
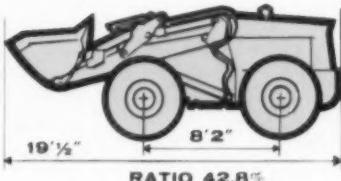
5-way hydraulic filtering—for complete system protection. Two air filters and three hydraulic oil filters assure peak operating efficiency . . . extended service life. Filters are easily accessible for cleaning and replacement.

Pin-connected axles—directly attached to the frame with thick, solid steel pins (not lightweight U-bolt connections). On rugged terrain, there's no shifting or rolling of axles under load. Allis-Chalmers tractor loaders stay on the job.



Important advantages are **TO YOU ONLY IN ALLIS-CHALMERS TRACTOR LOADERS**

built-in advantages



—up and
at score
hydraulic
cylinders
y to the
ight . . .

Top stability—For example . . . the TL-30 has an 8' 2" wheel base to a 19' ½" over-all length . . . a 42.8 percent ratio of wheel base to length for plenty of stability to eliminate tipping or spilling even on rough terrain.

Key starting—just like a car. No cranking, pumping or waiting for these machines. Just a turn of a key and you're ready to work.

Control tower visibility—with tapered hood . . . narrow cowl and unobstructed view of front-mounted equipment. Bucket-type seat is adjustable to operator's own preference.



See an Allis-Chalmers tractor loader before you buy your next unit. You'll find a model and size best for you in every way—in power, in production, in value. Your Allis-Chalmers dealer will demonstrate on your job, gladly!



Your Allis-Chalmers dealer
is in business to . . .

PROTECT YOUR EQUIPMENT INVESTMENT WITH COMPLETE SERVICE

When you invest in Allis-Chalmers equipment, you get top performance in *every respect*. Your Allis-Chalmers dealer is fully equipped to serve you completely, conveniently. Make him your single source for:

- **Complete Parts Service**—original-quality parts on hand to meet your requirements quickly.
- **Ready-to-go Exchange Assemblies**—completely reconditioned assemblies on call. Your trade-in assembly is rebuilt without overtime charges . . . your machine is back to work quickly. Your cost? Only parts and regular-time labor needed to recondition your old assembly.
- **Specialized Service—Shop or Field**—top-notch mechanics are factory-trained to service your needs efficiently in a fully equipped shop or on your job.
- **Tailored Financing**—terms suited exactly to the financial requirements of all your machinery needs.

From one convenient source, then, you get the complete service package—job application information, new and used equipment, parts, service and financing. Who could be more interested in backing you up than your own dealer? That's his *business*!

Your every transaction in sales, parts, service and financing is fully backed and . . .

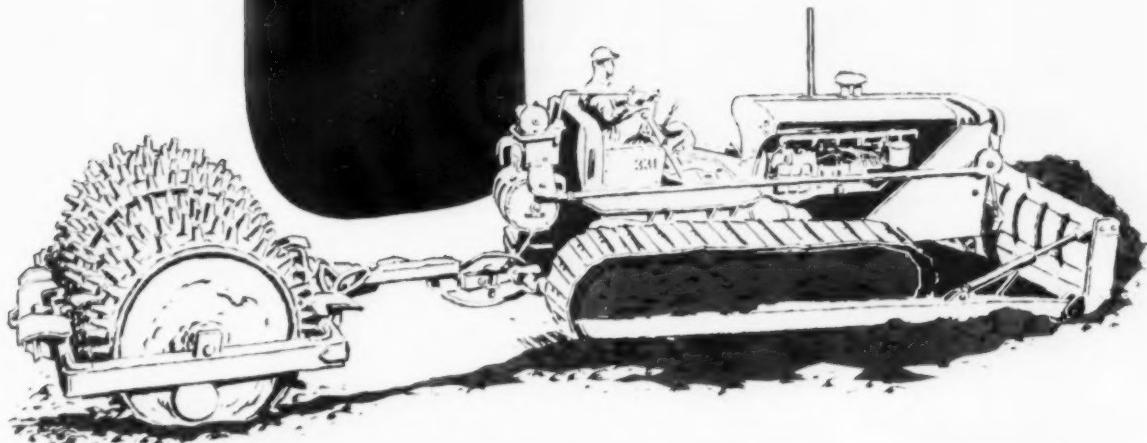
ALLIS-CHALMERS
POWER FOR A GROWING WORLD

PRINTED IN U.S.A. D&L-61





... THE CHEMICAL AID TO SOIL CONTROL



REDUCES COMPACTION TIME

New money making Partner to regular compaction methods

Good compaction practices plus use of Chempact will reduce compaction costs where difficult soil conditions exist; Chempact also makes many soils normally wasted . . . usable in grades and fills.

WRITE NOW FOR FREE
DESCRIPTIVE BROCHURE
. . . and further information

ANOTHER *REYNOLDS* FORMULA

EASY TO APPLY:

Merely add 1 gallon Chempact per 1,000 gallons of water as tank is being filled . . . Chempact requires no agitation.

ECONOMICAL TO USE:

1,000 gallons of water and 1 gallon of Chempact covers 5 to 10,000 sq. feet of surface area, depending on soil conditions.

LOW PRICE:

Chempact saves its cost a multitude of times . . . reducing on the job time for heavy equipment.

CHEMPACT

THE CENTRAL-REYNOLDS COMPANY

P. O. BOX 1203

FRESNO, CALIFORNIA

PHONE ADAMS 7-1249



**name's
NEENAH**

**and
the
products
are
GRAY and
DUCTILE
IRON
CONSTRUCTION
CASTINGS
of finest
QUALITY
FINISH
UNIFORMITY**



**Delivery is prompt: we have
huge on-hand stocks of stand-
ard items**

**PLUS
15,000 patterns
PLUS**

**a daily production capacity of
500 tons in our two plants.**



**Name's Neenah... if we make it
it's a casting... and the best.**

**New 168-page catalog shows our
line. It's sent promptly when
requested.**

**NEENAH FOUNDRY
COMPANY**
NEENAH • WISCONSIN
Chicago Office
5445 North Nega Ave., Chicago 31, Ill.

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Publications

Continued from page 40

ways Information Foundation, 2000 K St., N. W., Washington 6, D. C. A 32-page booklet detailing the source of highway finance, how it is spent and the comparative rise in the cost of highway financing to autos, gas and general cost of living. Also reviewed is the responsibility of local, state and federal governments in highway system development. Federal Highway Acts of 1956, 1958, 1959 and 1960 are reviewed. Copies are available free from the foundation.

AUTOMOBILE FACTS. 1961 Edition. Automobile Manufacturers Association, Inc., 320 New Center Building, Detroit 2, Michigan. A 73-page compilation of statistical data of possible interest to highway planners. Free on request.

MAINTENANCE TIPS FOR UNPAVED ROADS. A 36-page maintenance booklet published by the Calcium Chloride Institute, 909 Ring Building, Washington 6, D. C.

The specific maintenance procedures recommended for unpaved roads are the result of years of field experience and laboratory research. Separate sections deal with normal maintenance operations. Copies available free on request from the Institute.

INTRODUCTORY SOIL MECHANICS AND FOUNDATIONS. 2nd Edition. By George B. Sowers, Consulting Engineer, and George F. Sowers, Prof. of Civil Engineering, Georgia Institute of Technology. 386 p., cloth bound; numerous illustrations. \$8.00. College Department, The McMillion Company, 60 Fifth Avenue, New York 11, N. Y. A comprehensive text for students and reference for practicing engineers.

DESIGN OF WELDED STRUCTURAL CONNECTIONS. By Omer W. Blodgett, Design Consultant, and Dr.

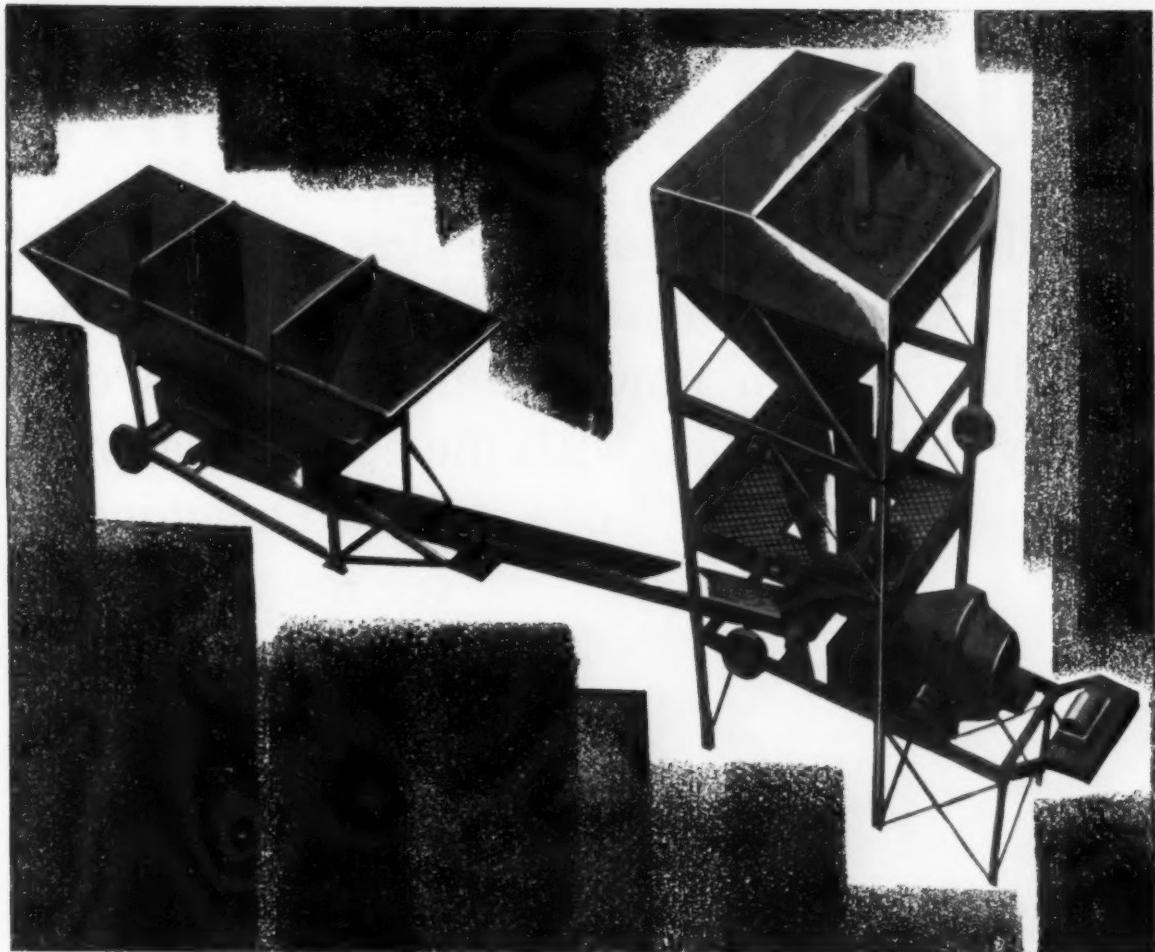
John B. Scalzi, Associate Professor, Case Institute of Technology. Price \$1.00 in USA, \$1.50 elsewhere, postage paid. Publisher, The James F. Lincoln Arc Welding Foundation, Cleveland 17, Ohio.

A new manual for structural engineers, designers, architects, and fabricators; a reference text for students. Summarizes current practices and gives examples and problems of applications. Does not discuss theory. Covers weldability of steels, welding procedures, design of connections for buildings and bridges by both elastic and plastic theories, erection, and inspection. Manual size 8½ x 11 in., double wire bound, simulated leather cover; 124 drawings, photographs, tables and examples.

ELECTRICAL ESTIMATING, 3RD EDITION. By Ray Ashley, Electrical Engineering and Estimating Consultant. 225 pages, illustrated, McGraw-Hill Book Company, 330 West 42nd Street, New York 36, New York. \$12.50.

Designed for the electrical contractor and estimator seeking to better his understanding of the field and increase business efficiency, the publication is replete with practical methods, tips and guides. Coverage includes selection and training of electrical estimators, and proper use of estimating tools through cost of preliminary estimates and preparation of final bid sheets. Sample estimates, methods of checking estimates and the preparation of labor-cost units are involved.

HIGHWAYS FOR THE FUTURE. Automobile Manufacturers Association, 320 New Center Building, Detroit 2, Michigan. A reprint of the summary chapter of a 400-page report reflecting the findings of a comprehensive study made on the effects of the future National System of Interstate and Defense Highways. The complete report was printed in limited quantity for use by public officials and specialists in the field of economics, transportation and urban planning.



On Wheels or Standing Pat... Central Mix Means Johnson

Where production of rigid specification concrete takes on giant proportions, one name in central mix plants clearly stands alone . . . C. S. Johnson.

Johnson experience is tightly locked in the aggregate of practically every major dam, hydroelectric project and other complex concrete pour that you can name. Batch by batch, over the years, Johnson quality has remained consistent . . . met the minutes of changing times with new and better ways of producing quality concrete at lowest cost per yard of material.

Take this new completely mobile central mix paving

plant for example. It is a fully automatic plant on wheels. Mix selections are available at the touch of a button and flip of a switch. It will duplicate the strict specification concrete you demand accurately, with new ease and speed. The low silhouette and compact design provides a plant that sets up and travels with a minimum of time, trouble and effort. Batcher is 8 cubic yards. The mixer is size 210S.

Whatever your needs in central mix plants . . . mobile, portable or stationary . . . C. S. Johnson can serve you best. See your distributor for details or write for information.

C. S. JOHNSON CO.

Champaign, Ill. • Stockton, California

ROADS AND STREETS, June, 1961

A Division of
KOEHRING
Company

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J101

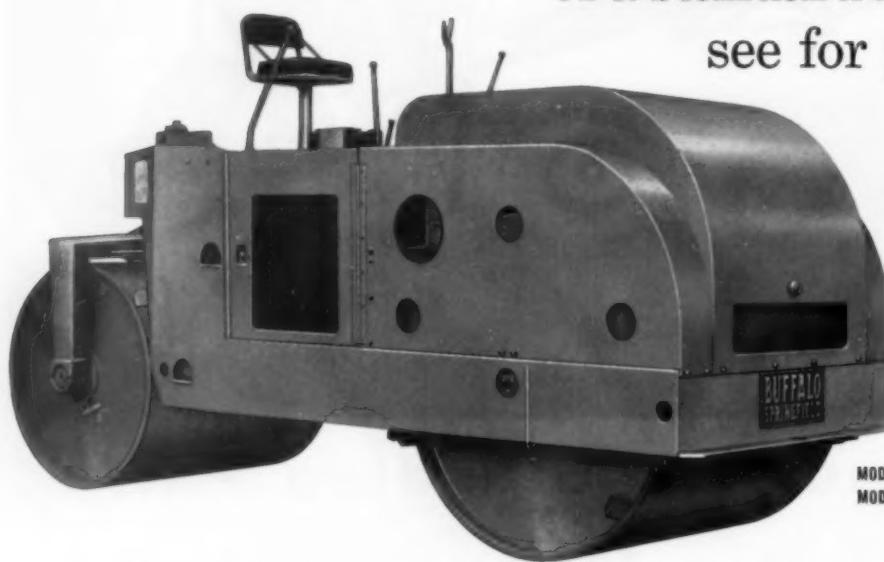
49

QUALITY: ECONOMY

Only Buffalo-Springfield can offer you this new 8-12 or 10-14 ton Deluxe Tandem that combines the field-proven performance features of a Heavy-Duty Tandem with the economical price of a standard machine . . .

see for yourself . . .

see your
distributor
today



MODEL KT-24E, 8-12 TON
MODEL KT-25E, 10-14 TON

Big value features that pay Big Dividends for years and years

Convenient Dual Control . . .

Full operation from either side of machine eliminates turn arounds and speeds up work.

Better Working Visibility . . .

High center, low side construction of drive roll hood provides optimum visibility for precision work.

Adjustable Bevel Gear Final Drive . . .

Easily adjusted to maintain positive drive at all times. Reduces maintenance costs.

Hydraulic Power Steering . . .

Permits most accurate control for smooth, close rolling with minimum operator fatigue.

Single-Unit Power Train Assembly . . .

Your assurance of precise alignment of all components for lasting, trouble-free performance.

Fully Enclosed, Armored Frame

Complete protection for final drive plus high ground clearance for closer rolling.

Box Yoke Construction . . .

Maximum strength, longer operating life and greater rigidity to keep you fully satisfied with your new DELUXE.

Side Air Intake . . .

An important feature that greatly reduces danger of clogging and gives you easier access to radiator.

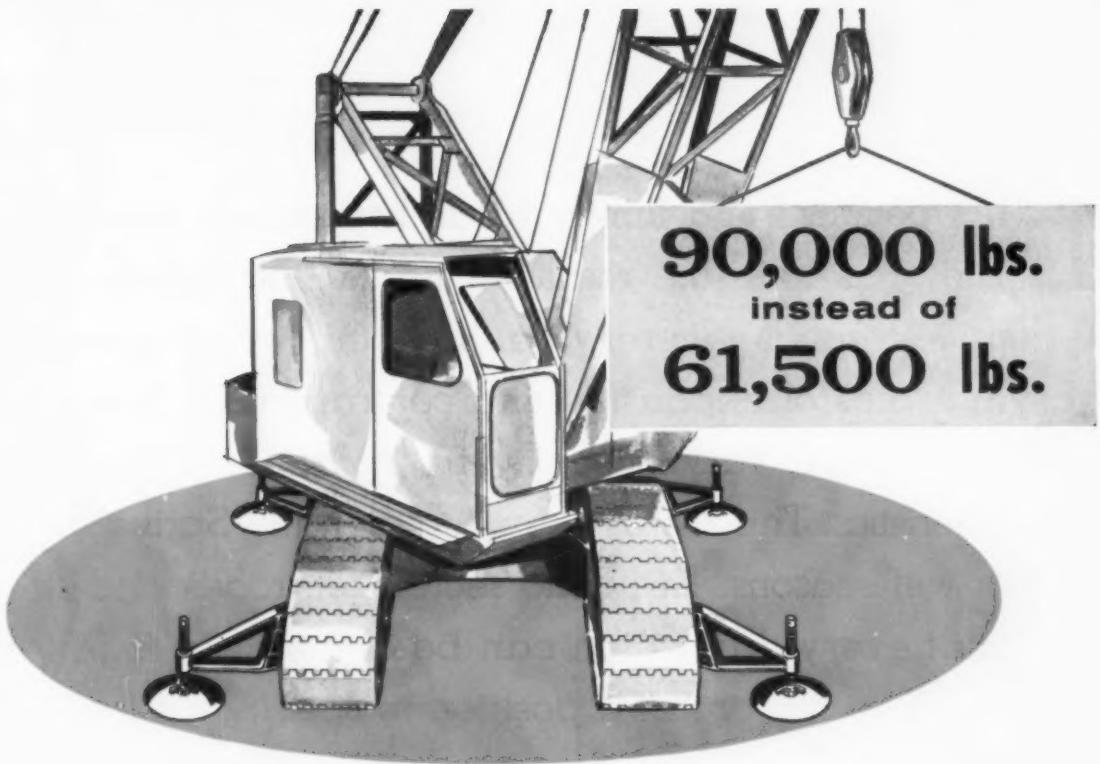
B105

BUFFALO-SPRINGFIELD CO.

A Division of
KOEHRING
Company

Springfield, Ohio

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**90,000 lbs.
instead of
61,500 lbs.**

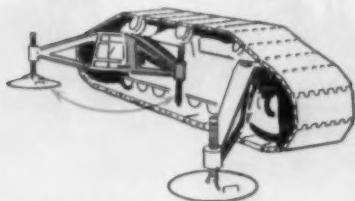
SOLID FOOTING: 46% MORE LIFT

"Sprawler" easily outlifts all crawler cranes of comparable size

**"Sprawler" plants four big feet
for bonus lift, better leverage**



Weight lifter uses wide stance
for better leverage, more stability.



Outriggers work on same principle, give better
stability than counterweight alone. Increase
your lift capacity from 61,500-lb to 90,000-lb.

Watch a weight lifter and you'll see the secret of the 545 Sprawler's bonus lifting capacity. Feet are spread and firmly planted to provide greater leverage . . . more stability under load.

Sprawler's pivoting outriggers provide a big, square, firm foundation . . . increase lifting capacity 46%. They are an integral part of the rugged, one-piece carbody, resist torsional strains at every working angle.

When crawling, outriggers tuck in close to crawler frame. And it takes only a few minutes to swing them out and pop on the pedestals to increase your lifting capacity. The 545 handles up to 150 feet of boom and jib.

545 Sprawler
MAXIMUM LIFT CAPACITY WITH
OUTRIGGERS IN PLACE:
90,000-lb

545 Sprawler
MAXIMUM LIFT CAPACITY WITH
PEDESTALS RAISED FOR WALKING:
61,500-lb

There's a Model 330 Sprawler, too! Lift bonus is 69%. The 330 will walk loads up to 35,450-lb, but with outriggers in place will lift 60,000-lb. See your distributor for details. K29

KOEHRING
DIVISION OF KOEHRING COMPANY
Milwaukee 16, Wisconsin

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LUMPY potatoes and lumpy roads have much in common. They are both the result of insufficient mixing. This is serious with roads—literally earthshaking—for it gives them varying rates of expansion and contraction. It gives them uneven texture, varying moisture intake and dissipation characteristics. This is why they heave in the Spring, buckle during wet seasons. This is no secret. Yet, roads and streets are built every day which can be calculated to fail like clockwork. If you are in a position to specify, find out why rotary in-place blending of native soil prevents this expensive havoc . . . why a PULVI-MIXER or a TRAV-L-PLANT literally homogenizes material into a stable base . . . and saves thousands of taxpayer dollars yearly. Write for the free brochure entitled "Sta-Bilt Roads . . . Modern Way to Better Roads at Less Cost per Mile!" American-Marietta Company, Construction Equipment Division, Milwaukee 1, Wisconsin.

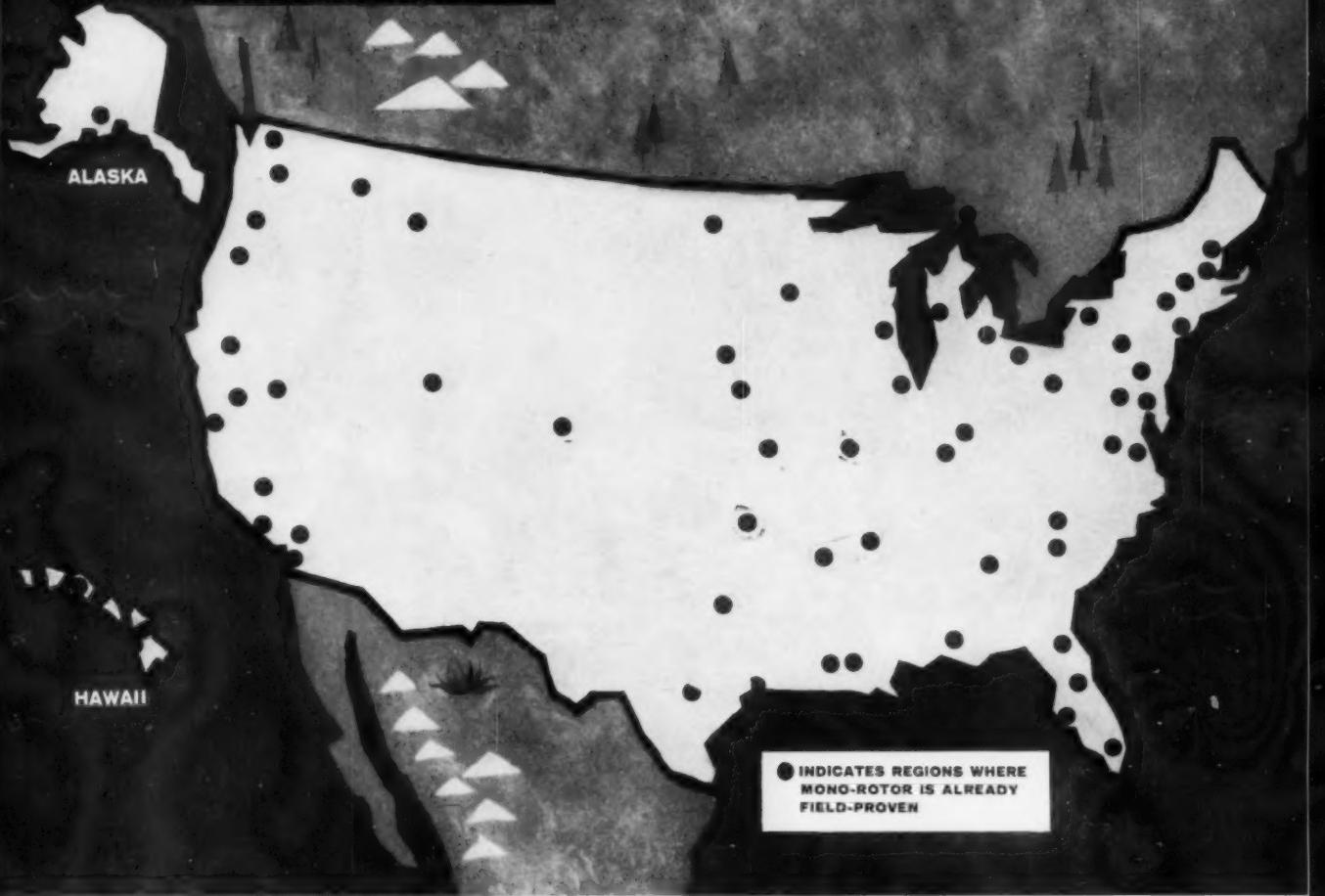


... for more details circle 277 on enclosed return postal card

52

AMERICAN-MARIETTA
ROADS AND STREETS, June, 1961

WORTHINGTON COMPRESSOR NEWS:



MONO-ROTOR PROVEN...WARRANTY QUADRUPLED

The new line of Worthington Mono-Rotor compressors has gained extensive field experience with outstanding success. Performance has been so successful, in fact, that Worthington has lengthened its warranty period from 3 months to one year. It is the first major construction industry compressor manufacturer to do so.

Mono-Rotor units have proven themselves in widespread areas over the last 3 years. They are in locations ranging from New York City to Hawaii—from Alaska

to Argentina. Service conditions have ranged from the intermittent use in winter and summer to three-shift use for months at a time.

What makes the Mono-Rotor compressor so dependable? It is extreme simplicity.

are 20% lighter in weight and are designed for improved towing and tracking. The 3rd wheel is standard equipment for easier handling on the job. It runs all day on a tank of fuel. There's an engine-saving clutch and many other features.

The Mono-Rotor can now be ordered in the 85', 125' and 250' sizes. See it . . . rent it . . . or buy it at your Worthington dealer listed in the Yellow Pages under "compressors". Or write Worthington Corporation, Dept. 60-39, Holyoke, Mass. In Canada, Worthington (Canada) Ltd., Brantford, Ontario.



NEW 125' MONO-ROTOR BLUE BRUTE

It actually has 63% less parts than its two-stage predecessor. The Mono-Rotor has just one stage, one rotor, two bearings, no gears and no oil pump. No other compressor design is so simple.

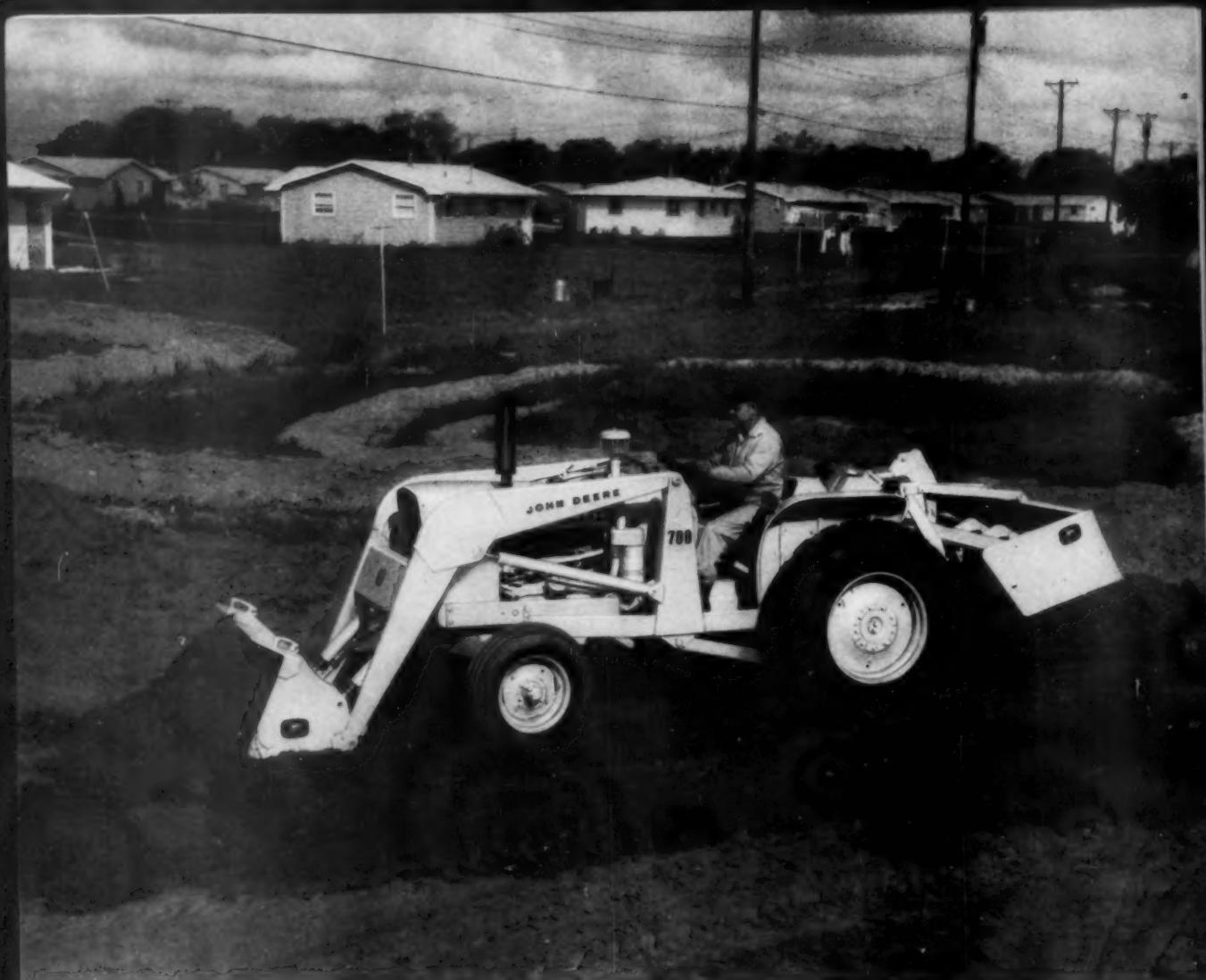
The new Worthington Mono-Rotor compressors have other benefits, too. They

MONO-ROTOR: 1 STAGE...1 ROTOR...
2 BEARINGS...NO GEARS...NO OIL PUMP



PRODUCTS THAT WORK FOR YOUR PROFIT

... for more details circle 347 on enclosed return postal card



For cost-cutting performance, job test the new John Deere 2010 Wheel Loader

Put it to work loading, spreading fill, cleaning up shoulders and approaches—prove to yourself the advantages of 52 engine horsepower plus John Deere's new brand of high maneuverability and handling ease!

Power steering helps boost work output on loading and material-handling jobs. New low profile adds stability, aids operator vision. Power-matched backhoes operate with simple two-lever control—do fast, clean work setting drain tile and culverts. Choose center-mounted or five-position model, adjustable in the field. Heavy-duty rear blade, scarifer-scraper, com-

bination seed-fertilizer applicator and other three-point equipment insure start-to-finish usefulness on every road, highway, or building-site preparation contract.

Advanced transmission with constant-mesh gears provides eight speeds forward, three reverse to meet any operating requirement.

To set up a new John Deere "2010" Wheel Loader demonstration on your job, contact your John Deere dealer through the yellow pages of the telephone directory.

John Deere, 3300 River Drive, Moline, Illinois.

... for more details circle 294 on enclosed return postal card



LOADERS

BULLDOZERS

BACKHOES

AND

EARTHMOVING

EQUIPMENT

Precise Specifications Help Bidder, Inspector, Everybody

By Thomas J. Roche

Cook County Highway Department
Chicago, Illinois

If a boy is sent to the store for a spool of thread, he will probably bring one back because he knows the general dimensions of a spool of thread. But it would be phenomenal if he brought back the exact spool wanted from the hundreds available unless he had a description of the kind of thread wanted—the material, its color and fineness. He would know quantity but not quality, and would be in the position of the contractor with excellent quantity plans but inferior quality specifications.

When construction costs are considered, quality is as important as quantity, so that preparation of specifications is as important as preparation of plans. If a dimension is left out of a plan it may still be obtained by scaling, but if a specification is left unwritten there is no way to supply it. Specifications are part of a contract—a meeting of minds. It is difficult to have a meeting of minds if specifications are vague, incomplete or arbitrary.

The writer of specifications should have a good background in design, and also in the prevalent methods of construction. It is presumed that he will know not only the materials available, but the difficulties of working with these materials in construction.

The specification writer should emphasize the *what* and not the *how* of an improvement operation. To do this properly he must have

an extensive vocabulary to give an accurate word picture of the construction required. When the correct terms are selected they should be repeated throughout the specifications; as synonyms are just confusing to the bidder. Words of several meanings should be avoided.

Sentences should be simple and short for clearness of meaning. They should also be definite, using "will", "must", and "shall" rather than the indefinite "can", "should", and "may". The specification writer should know the exact meaning of these six words, as their misuse not only invites contingency additions to the bid but are a continual source of misunderstanding during construction.

A book of specifications is handier if it is made pocket-size with a readily usable index. The first pages should contain definitions of the more general terms, so that all concerned are speaking a common language. A standard form of specification covering all payment items helps to clarify construction requirements and promote uniformity. The outline might be as follows:

Description of Payment Item
Material Requirements and Tests
Construction Methods, Equipment and Tools
Method of Measurement
Basis of Payment
Lump sum items within the con-

tract are a frequent source of indefiniteness. While they may save time in quantity takeoff and specification writing, they may not always save money in the bids. An exception might be made of "incidental to the contract" items. These items might be summarized in a separate quantity takeoff, with a lump sum bid for "Incidental Items" in the Summary of Quantities. Designers may be surprised to find that the combined "Incidental Items" are not incidental, dollarwise.

The specification writer should also review the specifications to see that they are not ambiguous, arbitrary, indefinite or indeterminate, and clarify them if possible. Examples of such uncertain specifications are as follows:

Restrictions of a general nature
Unreasonable or unnecessary requirements

Insufficient completion time allowance

"— cost of this item shall be considered as incidental to the contract."

"— the work shall be done in a sufficient (or proper) manner."

"— the work shall be done to the satisfaction of the Engineer."

"— if approved by the Engineer."

"— as the Engineer shall direct (desire or prescribe)."

Continued on page 91

Old Viaduct Let Out At the Seams

Resourceful structural adaptation and field methods mark the widening of an elevated expressway in Brooklyn.

Roads and Streets Staff Report



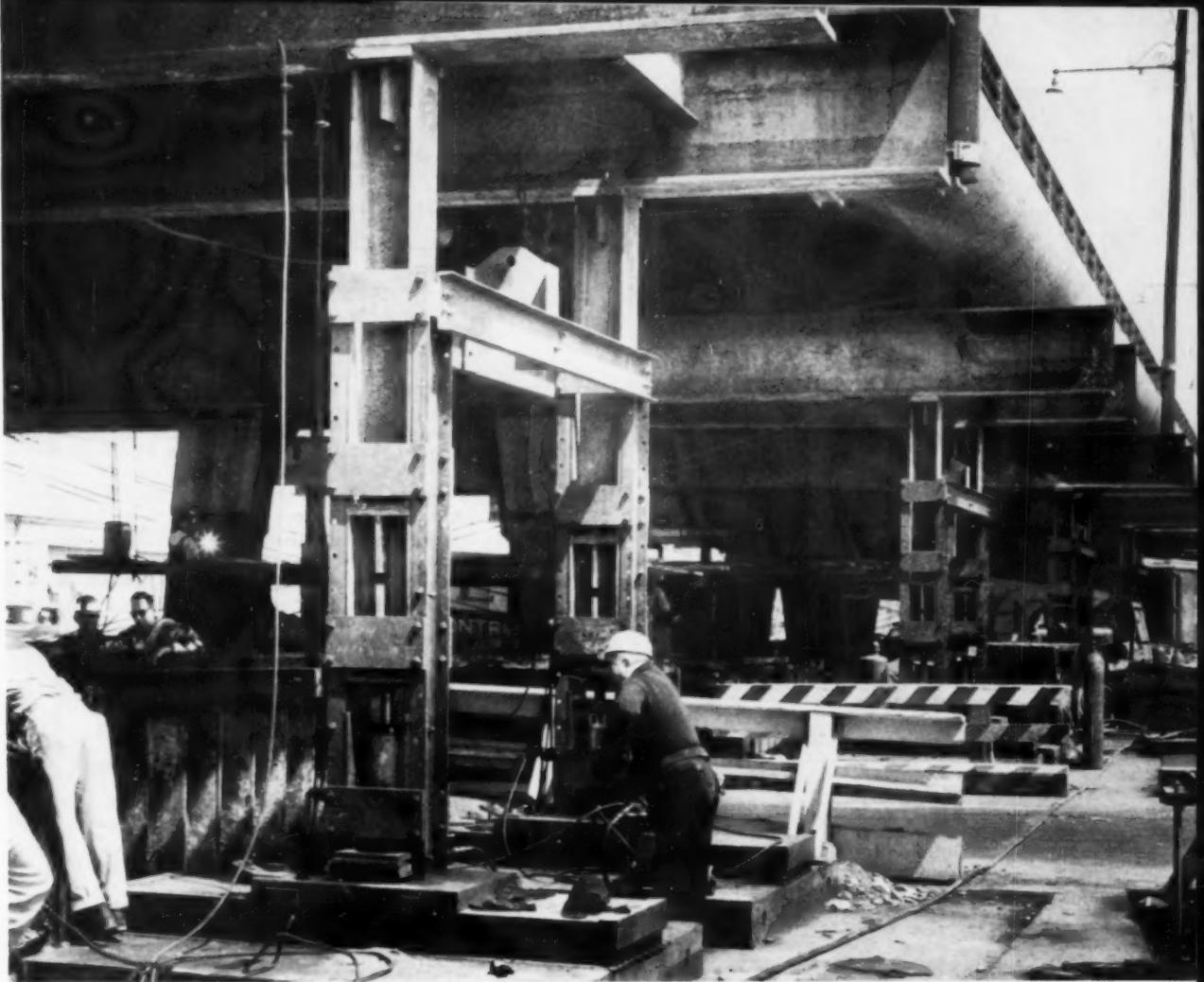
You might paraphrase it, "A Viaduct Grows in Brooklyn," in describing what is happening to Gowanus Parkway in New York City. This 4-lane elevated highway along 3rd Avenue in South Brooklyn is being widened to six modern expressway lanes to connect with the Battery Tunnel at Manhattan Island's lower tip and the gigantic Narrows Bridge being built to Staten Island.

Revamping the elevated structure, a \$600,000-per-block task, is divided among several contracts. These notes describe structural features and some of the job methods for the 0.8-mile segment from 20th to 36th Street. Fehlhaber-Terry, a joint venture of Fehlhaber Corp. and Terry Steel Contracting Co., took this \$10 million section early in 1960 and will work into 1962. The project is part of the metropolitan-area expressway program under the New York Department of Public Works, Babylon district, with Madigan-Hyland as the consulting engineers.

The existing Gowanus Parkway viaduct at this location represents an extension to a modification made

in 1940 of an old elevated railway structure. The first thinking in planning the present project was to replace the existing structure in its entirety. Instead, following alternate design studies, it was decided to utilize the existing steel work and incorporate it, under traffic, into a strengthened and widened structure. The structural adaption was done under the direction of Captain H. Praeger, partner of Praeger-Kavanaugh, consulting engineers, taking advantage of Captain Praeger's familiarity with the structure as its designer in 1940 while then with Madigan-Hyland.

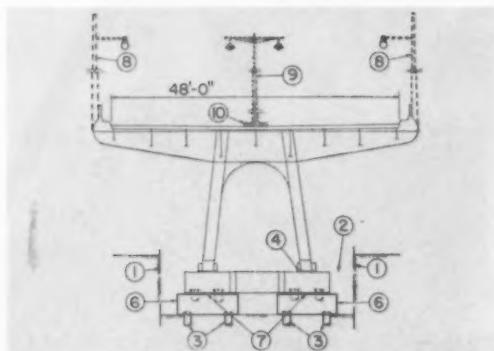
The structure as it existed from 1940 to the present carried two 28-ft. two-lane roadways with 4-ft. center mall. Spans of 52 ft. are carried on single A-shaped two-column steel bents with cantilevered cross-beams. The basic problem was to construct new pile-supported footings under the existing footings to enlarge and strengthen the column supports, strengthen the pier columns, add new longer cantilevered cross-beams, and end up with a new deck carrying six 12-ft. lanes and a 13-ft. center mall. And, to do all this with no interrup-



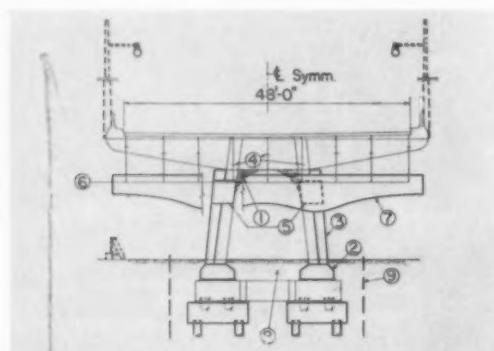
Six bents at a time are surrounded by temporary I-beam false work frames, mounted on jacks, so that columns can be relieved of the deck load during the structural modification work.

Another short-boomed rig seen on the viaduct job—a P&H truck crane working under the low deck.

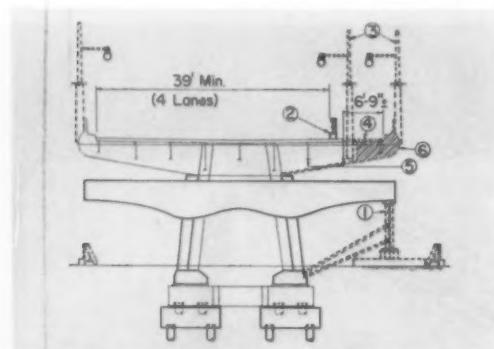




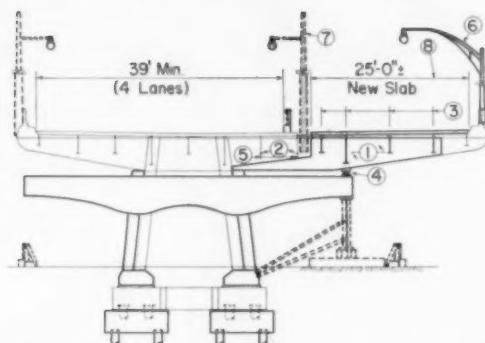
Stage A—Strength Foundation For complete details see text.



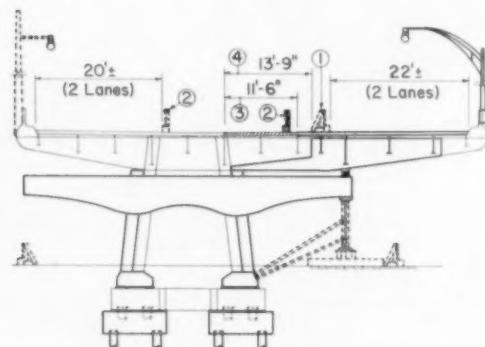
Stage B—Strengthen Bent Structure (1) Remove curved diaphragm under floor beam strut. (2) Revise column bases, and provide required shims to raise structure to final grade. (3) Install additions to columns. (4) Revise existing expansion bearings on all stringers between and including two girder stringers. (5) Install pin plates on columns. (6) Return loads to strengthened columns by releasing jacks. (7) Erect bracket girder. (8) Backfill. (9) Remove sheet piling.



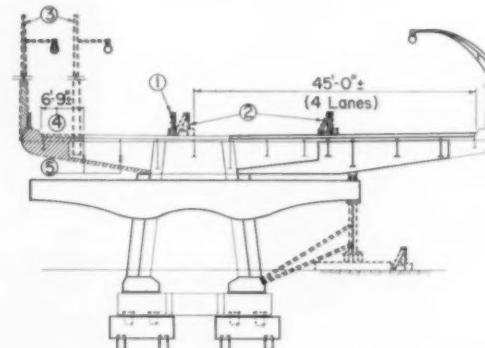
Stage C—Widen Northbound (East) Roadway (Removal of East Facia) (1) Install temporary column at east end of bracket girder. (2) Install temporary barricade. (3) Move temporary light poles along east facia to position behind barricade. (4) Remove part of deck slab near east facia. (5) Remove loads on stringers, which are connected to the floor beam cantilever arm, by jacking against erection falsework towers. (6) Remove east facia, curb stringer and bottom flange of cantilever floor beam.



Stage D—Install New Roadway (1) Erect remaining and extended portion of the floor beam cantilever arm and facia assembly. (2) Revise existing stringer expansion bearings. (3) Install new stringers. (4) Install bearing between finished floor beam and bracket girder, transferring loads directly to the temporary column. (5) Return loads to finished floor beam by releasing jacks. (6) Install new light poles. (7) Remove temporary light poles. (8) Place new concrete deck slab.



Stage E—Repave Existing Roadway (1) Install temporary barricades. (2) Relocate temporary barricade installed earlier. (3) Remove part of existing deck slab. (4) Place new concrete deck slab within limits as shown.



Stage F—Widen Southbound (West) Roadway (Remove West Facia) (1) Remove barricade installed under Stage 4C. (2) Relocate barricade installed under previous stage. (3) Move temporary light poles along west facia. (4) Remove part of deck slab near west facia. (5) Remove loads on stringers connected to the floor beam cantilever arm, by jacking against erection falsework tower. (6) Remove west facia, curb stringer and bottom flange of cantilever floor beam.

LEGEND

- Existing work
- New work
- - - Temporary work req'd. during construction
- Work to be removed
(For drawings on pages 58 and 59)

tion of traffic on deck, and with a minimum of interference to traffic along the streets below. Under the contract terms, four express lanes must be kept open on deck at all times. The work sequence was planned with that requirement in mind.

The elevated roadway is on a 0.38 percent grade, the 34 bents within the contract having graduated heights. A problem has been to perform work beneath the deck despite the cramped headroom. Short-boomed cranes and a special short-lead pile driving rig are features of the job.

Third Avenue along the work consists of a pair of industrial streets flanking the existing viaduct. These streets remain intact in this contract section. The contractor is required to erect heavy barricades along the inner curbs and on both curbs where cross streets pass under. The plan is to keep the under-viduct work walled off as completely as possible from children and curious adults. Movement of equipment, structural units and forms, along the parallel service roads has also been a constant problem, due to the very heavy truck traffic along the twin flanking roadways.

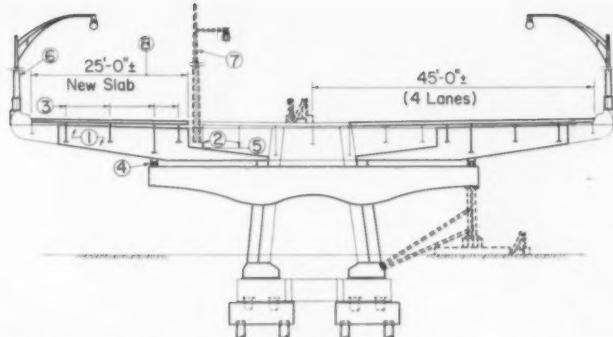
The contractor's first work is to strengthen the existing bent foundations. Carried through progressively from one end, this consists of the following steps printed on the plans, as here enumerated and briefly commented on:

Stage A—Strengthen Footings

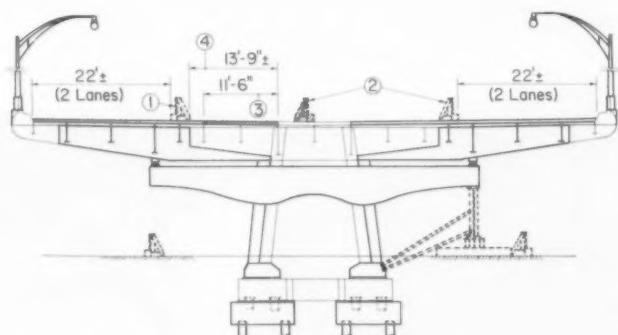
1. A rectangular sheet pile cofferdam is driven around the existing bent footing, using a P&H truck crane with short (25-ft.) boom and Vulcan No. 0 sheeting hammer.

2. Excavation is done during or following the sheet pile driving, using a Northwest backhoe.

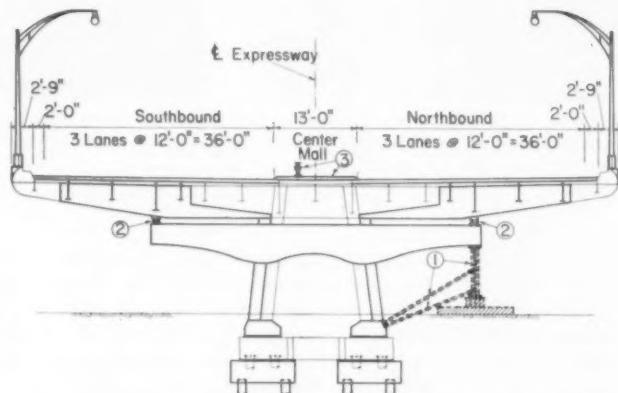
3. New footing piles are driven around the periphery of the existing footing. These consist of 8 to 12 steel pipe piles per bent, the 18-in. diameter piles ranging to 130 ft. in length and averaging about 92 ft. Driving is done with an Industrial steam crane with 25-ft. boom. This rig operates a McKiernan-Terry C-8 steam hammer in special short leads. Piles are driven in 13 to 20 ft. lengths and spliced with welded collars. Driving has averaged 300 to 400 ft. of pile per full working day, with sometimes over 450 ft. but more often there is



Stage G—Install New Roadway (1) Erect remaining and extended part of the floor beam cantilever arm. (2) Revise existing stringer expansion bearings. (3) Install new stringers. (4) Install bearing between finished floor beam and bracket girder. (5) Return loads to finished floor beam by releasing jacks. (6) Install new lighting standards along west facia. (7) Remove temporary lighting poles. (8) Place new concrete deck slab.



Stage H—Repare Existing Roadway (1) Install temporary barricades. (2) Relocate temporary barricades from previous stage. (3) Remove part of existing deck slab. (4) Place new concrete deck slab within limits shown, completing the south-bound roadway.



Stage I—Completing Expressway (1) Remove temporary column and its braces. (2) Add shims at bearings between floor beam and bracket girder. Adjust and balance reactions to be transferred to bracket girder. (3) Install center mall and mall barrier.



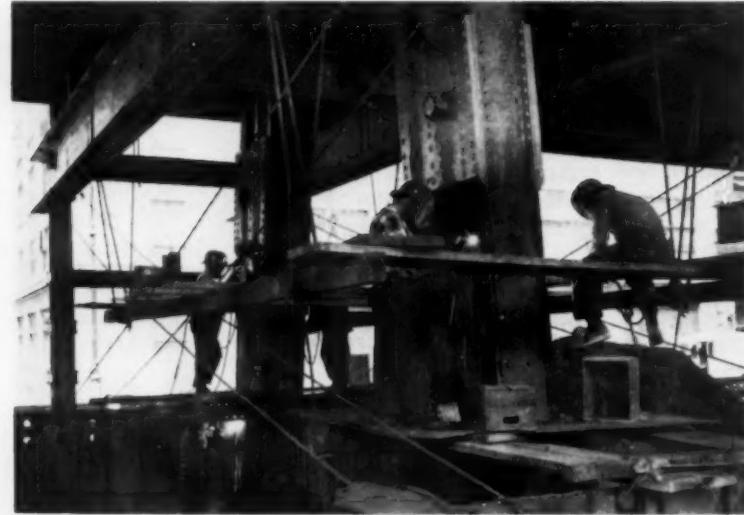
At this stage the new column component is in temporary position leaning against the existing column. The assembly will be pulled up parallel when welding work is ready to begin.



Operating one of the four 100-ton hydraulic jacks to raise a deck section, taking the dead load off of a column bent during its modification.



Getting set to drill another 6-inch hole in the old concrete footing, for setting anchor bolts for the modernized columns.



Heavy welding work in progress on the columns. Here is a bent nearing completion, the new column component having been added.

a lesser footage due to waits on other work.

Piles are cleaned out with a Bucyrus-Erie 22-W well rig alternately churning and suctioning out the soil materials. To counterbalance hydrostatic pressure the piles are left water-filled until time to seal them. Sealing is done by sinking seven burlap sacks of portland cement to the bottom and breaking the sacks. Concrete filling proceeds soon thereafter.

This sealing method has been completely successful against blow-ups from the bottom.

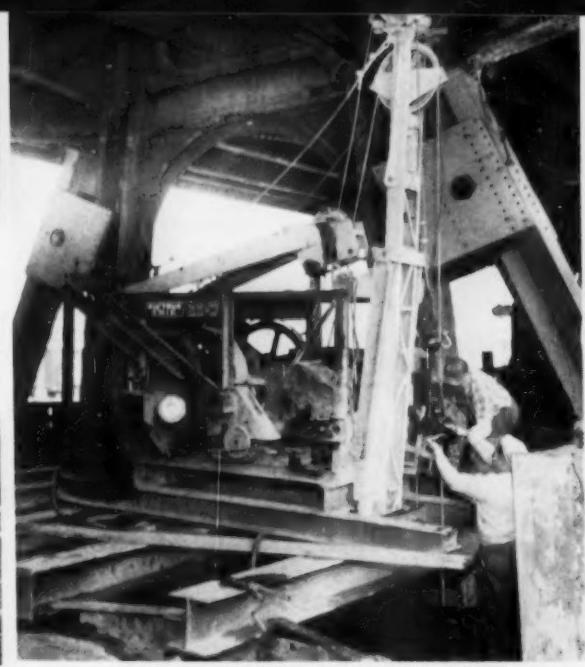
4. The scheme for strengthening the existing col-

umn footings is to construct a larger pile-supported footing immediately beneath. The concrete encasement is first removed from around the old footing. Six-inch diameter holes for grouted anchor bolts are cut by a manually operated diamond drill rig.

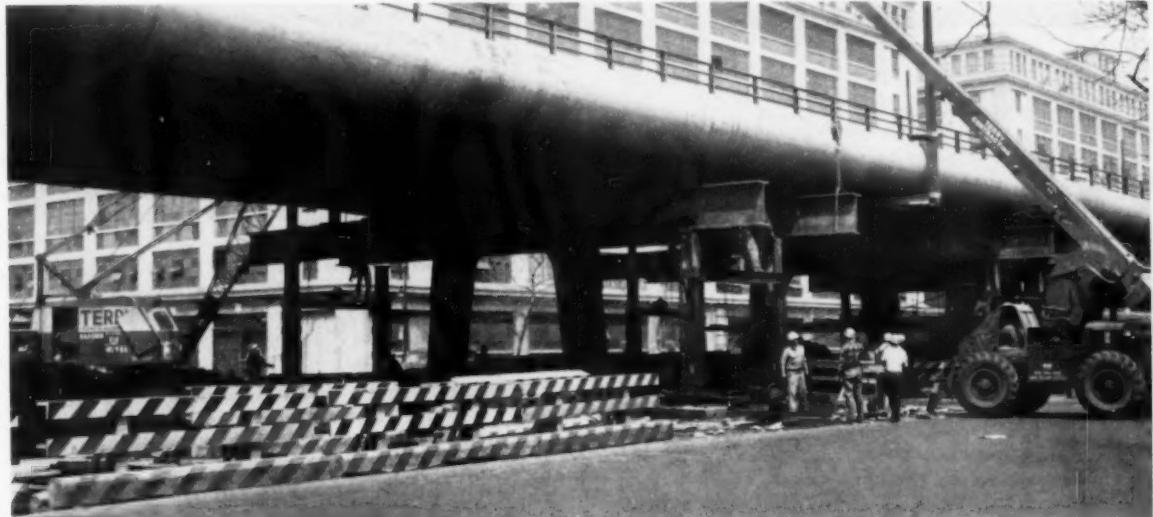
5. Next comes the problem of relieving the bent of its deck load. This is done by setting a pair of heavy steel falsework beams, supported on framed columns at either end, each column being carried on a 100-ton hydraulic jack. The falsework beams lift against all floor stringers via welded risers. The jacks are founded



A "shorty" pile rig, designed for getting under the low deck for driving new footing piles.



Well-drill rig mounted on grillage over the sheeting, for churning and pumping muck out of driven hollow steel piles preparatory to concrete-filling them.



The jack-supported falsework frame, used to relieve columns of the deck load during structural changes, is being taken down by a crane located in each flanking street. The crane at the left is one of four Austin-Western hydraulic-boom units which are finding constant use along the work.

in turn on a timber grillage resting on a grout-leveled area of concrete street base.

The deck panel is raised 2 to 2½ in. and steel shims placed around the jacks for safety during the work.

Falsework on jacks are set up for six consecutive bents, in a progression which gives the welders sufficient time for the heavy work of bent revamping. As structural work at each bent is completed, the jacks are lowered and the falsework carried on ahead using a Link-Belt truck crane teamed up with an Austin-Western hydraulic-boom "cherry picker" crane. Each

crane, working along its respective service road, transports units of the dismantled falsework to the next bent, for another go-around.

6. Ready-mix is placed for the new footing after pumping the excavation dry and smoothing the bed. Steel prefab forms contain the footing pours.

7. The last two inches between the new footing and the old one above is then dry-packed.

8. New poles for viaduct lighting are installed at temporary locations and existing poles removed.

9. The raised concrete center mall on the old deck

Another scene during moving of a temporary false-work beam. A Link-Belt truck crane on the rear one.

Impact wrenches and high-strength bolts are playing an important role in the Gowanus Parkway viaduct renovation.



is cut away to provide for a temporary traffic lane during the close-off of other lanes that will follow.

Stage B—Strengthening Bents

Sequence for strengthening the bent structure is also spelled out in the plans. All steps are currently in progress from bent to bent, as follows:

1. The curved diaphragm is removed from under the floor beam strut.
2. Column base or pedestal modification work is next performed, involving shimming the structure to the final grade and location.
3. Column strengthening is done involving bringing in a major outer structural element. These shop-assembled units are leaned temporarily against the columns and hoisted into final position as the welders begin.
4. Existing expansion bearings on all deck stringers are revised between and including the two girder stringers.
5. Temporary horizontal pin plates are installed on all columns serving as templates to hold columns in accurate position while being modified.
6. The jacks are lowered under the falsework girders erected in Stage A, and the load is returned to the strengthened footings.
7. The bracket girder involved in the new bent design is set. (Again see accompanying sketches and photos.)
- 8-9. Backfilling is done around the footings, sheeting taken out.

Generator-Welder Station

Bent strengthening has made use of high-strength bolts (substituted one-for-one in lieu of rivets with the engineer's approval) and also a large amount of structural welding. Supporting the operation on two or more adjacent bents at a time, is a special portable assembly of equipment, housed in a weather-proof, security-proof trailer van stationed under the deck. Within the van is a Cummins diesel engine powered by a 150-kw generator unit which delivers a 440-volt, 225-amp DC current to eight Lincoln 400-amp welders. The welders are compactly located in two tiers along the back and side walls inside the van.

This assembly, made up for this job, has greatly expedited the structural welding for the bents. Particularly it has saved much time and labor that would otherwise have been involved in moving numerous individual equipment units around. Six or more additional welding units are scattered along the job for deck work and other miscellaneous welding.

Stage C—First Deck Modification

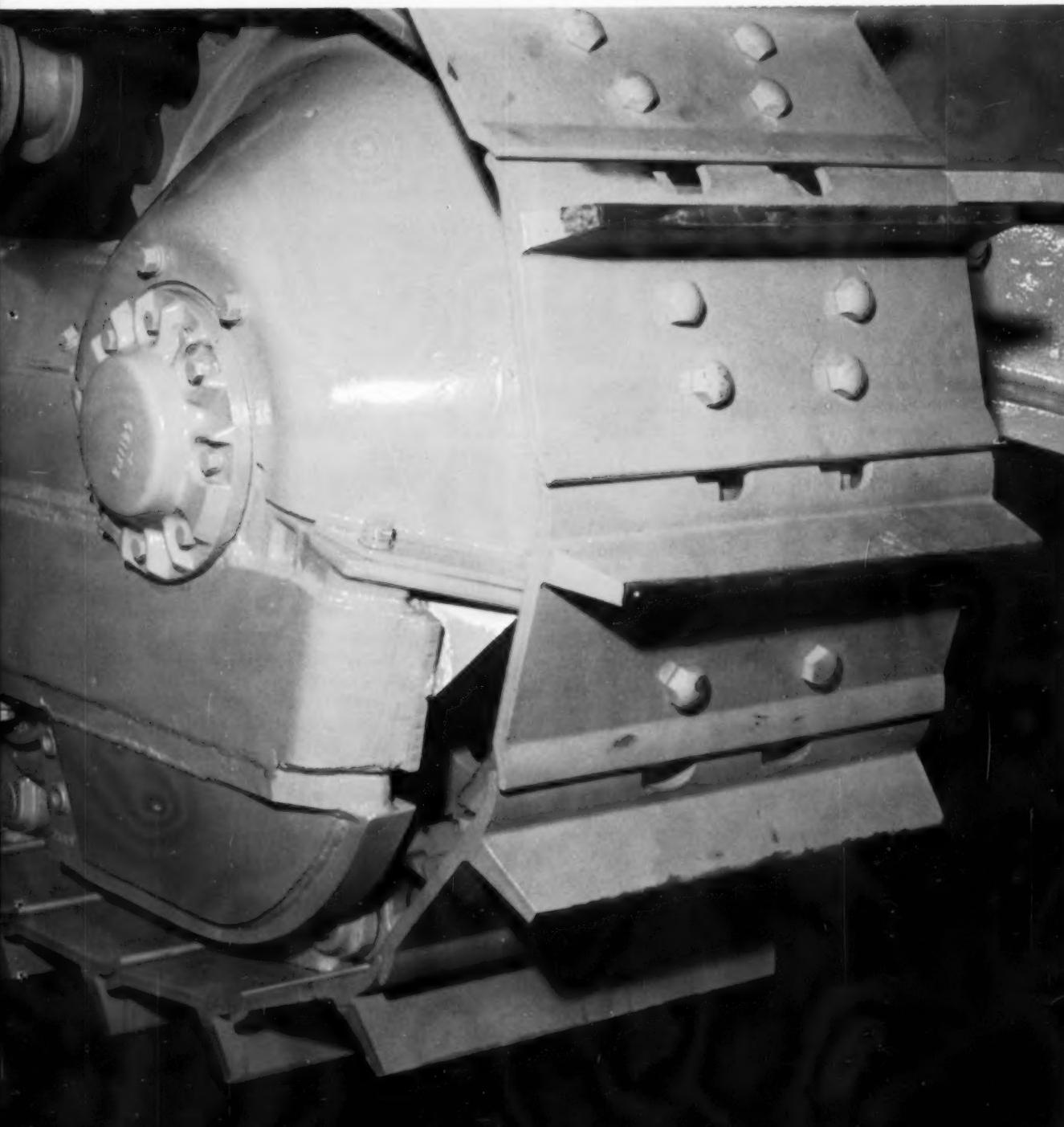
Stage C recently started consists of steps designed to begin the shifting of deck traffic to new lanes as the deck widening progresses:

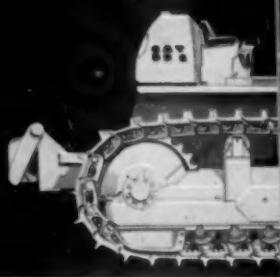
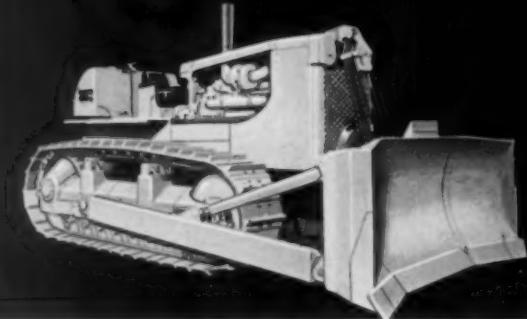
1. A temporary column is installed at the east end of the bracket girder. This column is supported on a steel grillage and concrete pavement.
2. Temporary barricades are placed in the new posi-

Continued on page 67



385 HP! FROM CATERPILLAR...THE NEW D9G





NEW D9G: 385 HP, 64,800 LB., POWER SHIFT,

For high-volume dozing, pushloading or ripping, the new D9G has what it takes . . . at minimum cost per yard!

The engine in the new D9G delivers 385 flywheel horsepower. That's *100 more horsepower* than the first D9 introduced five years ago!

Weight: 64,800 lb.—14% more than the first D9!

Torque divider power shift transmission . . . massive

heavy-duty undercarriage . . . and power train with new, built-in ruggedness for long life.

What else is new? Matching the D9G, to make best use of its power, is a full line of attachments. Cable controls, hydraulic controls, pushing equipment, dozers, rippers and others—all designed to help this new tractor really put out on the toughest big jobs.

CAT D353 ENGINE AND MATCHED POWER TRAIN

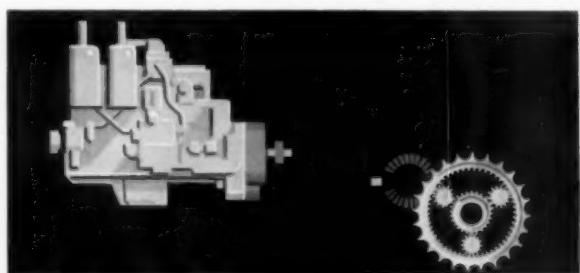
Engine: This engine, rated at 385 HP (flywheel) at 1330 RPM, has been proven over thousands of hours on the roughest jobs. Cat-built, its 6.25" x 8" 6-cylinder design now incorporates these new features:

- **Controlled Turbocharging**—This system, found only in the D9G among crawler tractors, automatically forces more air into the cylinders during lug. Result: increased maximum torque, fast engine response over a wide range of operation.

- **Aftercooler**—Air leaving the turbocharger passes through a water-cooled heat exchanger. Cooled air has greater density. Thus, more air can be packed into the cylinders, giving greater power output and efficiency.

- **PLUS**—Shroud-mounted fan with torque limiting clutch provides maximum cooling during lug and reduces fan-absorbed HP by 30%. Exclusive Caterpillar fuel injection system allows use of low-cost fuel. Also, twin dry-type air cleaners . . . oil-jet-cooled pistons . . . "Hi-Electro" hardened cylinder liners and crankshaft journals.

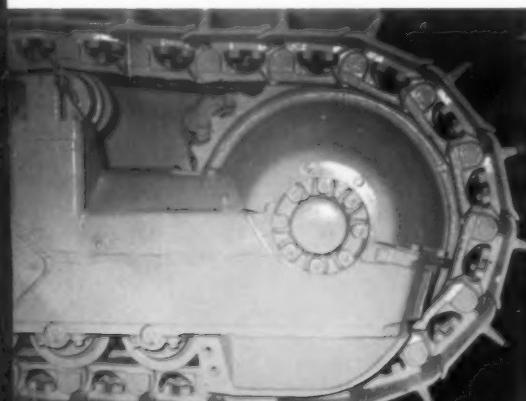
New Power Train: Major advances in the D9G's new power train include *new oil-cooled steering clutches and brakes*, *new planetary final drives*, and a time and cost saving *common lube system*.

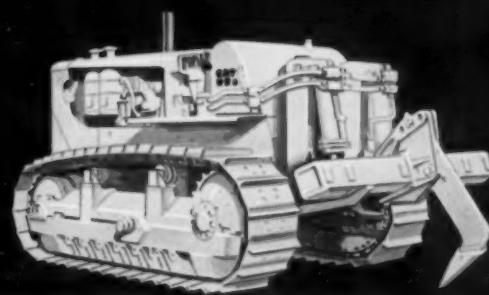
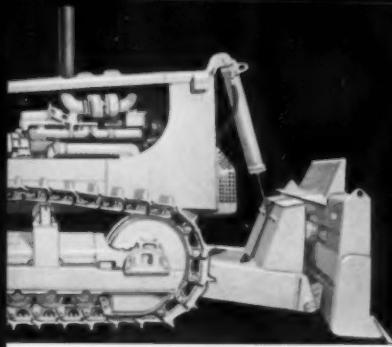


The new steering clutches, spring engaged and hydraulically released, need no adjustments. The longer service life of this type of clutch, as well as that of oil-cooled brakes, has been proven by millions of hours' use on D8H Tractors.

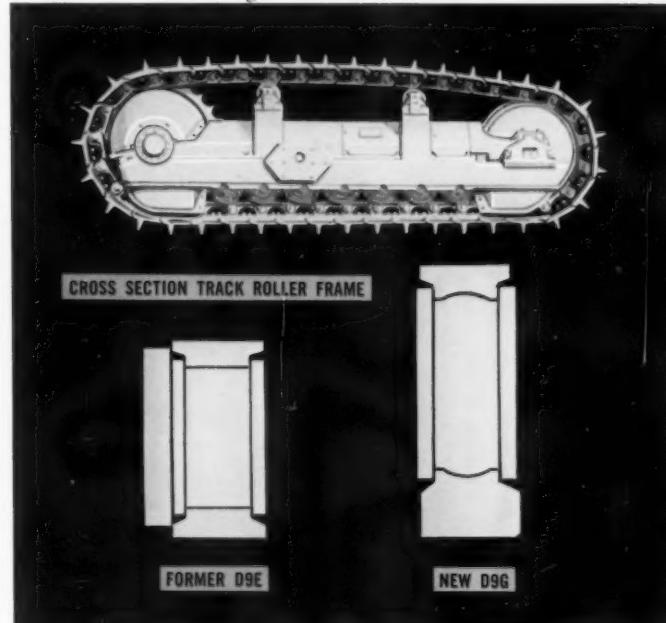
The new planetary final drives increase gear reduction ratios from 3.8:1 to 18:1, materially reducing torque load on all other power train components. A common system cools and lubricates torque divider, transmission, bevel gear, steering clutches and brakes. This means one service point . . . one type of oil. Final drives have their own pressure lube systems complete with pump, filter and disposable element.

Entire power train has unitized construction for fast, individual removal of components.





HIGH-PRODUCTION DOZER, PUSHER, RIPPER



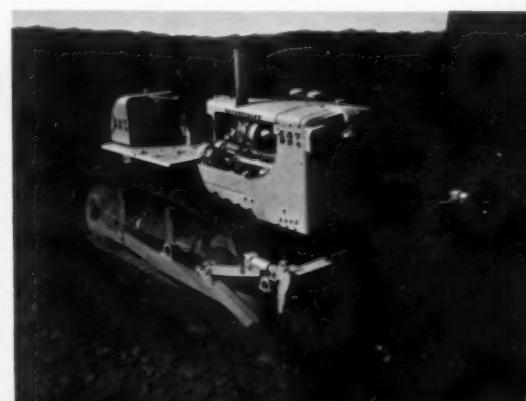
PROVEN TORQUE DIVIDER POWER SHIFT:

Standard equipment on the D9G, this exclusive Caterpillar design combines the efficiency and "snap" of direct drive with the load-matching and anti-stall characteristics of a torque converter.

A single lever gives the operator finger-tip control of his machine. It adds up to fast cycle times, less operator fatigue with greater efficiency. You get more out of the machine *all day*.

MASSIVE HEAVY-DUTY UNDERCARRIAGE:

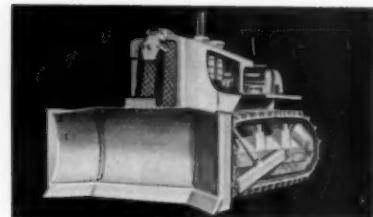
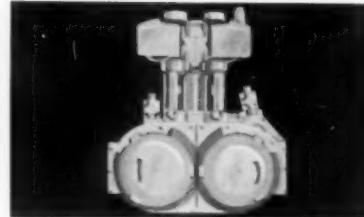
Immense strength and rigidity have been built into the D9G undercarriage to make it more than equal to the roughest ripping job. Box section frame is wider and deeper than previous models. Hydraulic track adjusters are standard. Lifetime lubricated rollers with special alloy deep hardened rims assure long life . . . and they require no servicing until rebuilt. These features give the D9G the finest big tractor undercarriage ever built.



The NEW 385 HP D9G—with high-production attachments

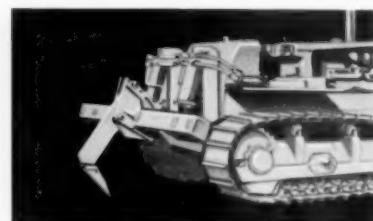
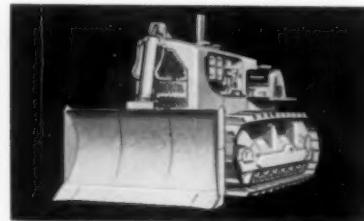
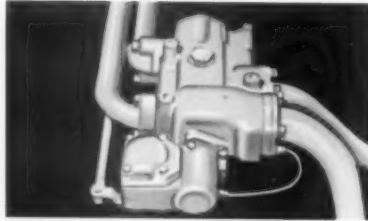
The D9G is big...and, it becomes versatile, too, with the many matching attachments your Caterpillar Dealer offers. Cable controls, hydraulic controls, rippers, dozers, pushing equipment, scrapers and others help make the D9G the most productive big tractor available.

To prove the D9G's productive capabilities on your job, talk to your Caterpillar Dealer.



New cable controls have larger clutch, brake and drum capacities and are hydraulically boosted. Available in front or rear single drum for dozer application. Rear single drum may be converted to double drum at any time. You buy what you need.

No. 9U can increase dozing production as much as 50%. Also available are No. 9A and No. 9S. Tilt cylinder can be used with U or straight blade. Choice of hydraulic or cable control for all blades. Hydraulic dozers have "quick-drop" valves.



New hydraulic controls available in nine arrangements to meet every application need.

No. 9C dozer combines dozing and cushioned pushing functions into one attachment. As a pusher, it allows 3 MPH cushioned contact. Rear-mounted cushion push block also available for tandem pushing.

No. 9 ripper—5-position clevis, selection of shanks and tips, quick-change features adapt No. 9 to a variety of materials and conditions... results in considerable savings over drilling and blasting.

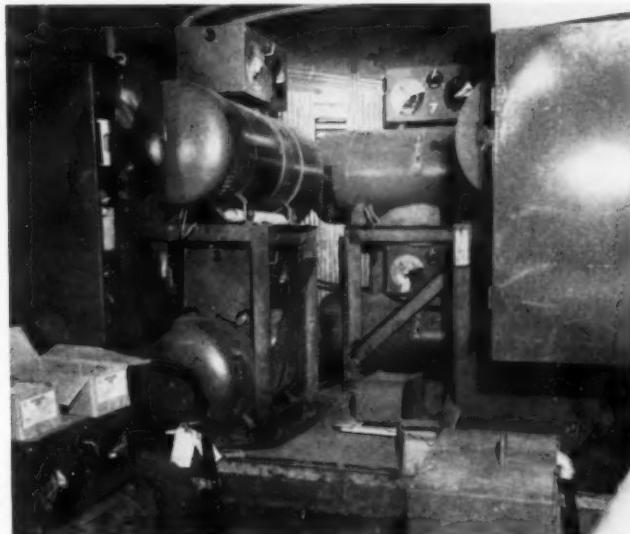
Caterpillar Tractor Co., General Offices, Peoria, Illinois, U. S. A.

CATERPILLAR

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A Cummins diesel powered generator and eight 400-kw welders are housed in this trailer, which is spotted near columns being worked on.



Inside the trailer, a glimpse of the welders closely arranged in a two-tiered semi-circle around the rear wall.

OLD VIADUCT LET OUT

Continued from page 62

tion required at this stage, flanking the east service roadway.

3. Light poles on deck along the east facia are moved to a new inner position with respect to the barricade below.

4. Part of the deck slab near the east facia is removed.

5. Loads are removed from the stringers, and stringers are connected to the floor-beam cantilever arm by jacking against the erection falsework towers.

6. The east facia curb is then removed, and also the curb stringer and bottom flange of the cantilevered floor beam.

More Stages to Come

This brings us up to stages that are just getting started as of early summer. Deck traffic will begin a shift to new lanes under stages D and E, confined to widening the deck on the east side. Widening on the west side, Stage F, will include removal and reuse of the west facia and related work. The temporary column supports, at the ends of the new long cantilever girders, are indicated on the plans as a suggested method. The contractor is required to submit detailed plans for handling this work with the engineer's approval.

New deck paving will follow as Stage H. Paving of the new wide raised center mall, removal of the temporary column and bracing, and cleanup work will constitute Stage I, which will wind up this interesting job in 1962.

'Fourth Dimension' Concept Challenges Steel Designers

"Today, research has developed a multiplicity of grades of new and different types of construction materials. . . . the designer must now concern himself not only with geometrical considerations but with that 'fourth dimension' which is the selection of the most satisfactory and economical type and grade of material to perform the required function."

This "fourth dimension" as applied to bridge design was a principal topic of a paper delivered in Pittsburgh April 27 by J. A. Gilligan, structures engineer for United States Steel Corporation. He spoke at a Steel Design and Engineering Seminar sponsored by U. S. Steel.

The "fourth dimension" has been readily accepted in bridge design, according to Gilligan. This is evidenced by the Carquinez Strait and Benicia-Martinez bridges in

California and the Louisville-New Albany bridge currently being erected over the Ohio River. Truss members of each of these bridges are shop-welded assemblies of plates, joined in the field with high-strength bolts. A heat-treated constructional alloy steel was used for the most heavily stressed members, a high-strength steel for the intermediate stressed members, and a weldable structural carbon steel for the lowest stressed members of the trusses.

The tension members of the Carquinez Strait bridge (Fig. 1) were H-shaped and the compression members were double and triple-web box sections. To compensate for the loss in section due to bolt holes in the ends of tension members, heavier plates were butt-welded to the main plates at the ends of the members.

The same problem arose during the design of the Benicia-Martinez bridge, Gilligan said. However, in this case, instead of welding on heavier plates to compensate for the loss in section caused by holes, plates made of a higher-strength steel in the same thickness as the main plates were butt-welded to the main plates to compensate for the loss in strength caused by holes (Fig. 2). Thus, whereas the solution in the Carquinez bridge was purely geometrical, the solution in the Benicia-Martinez bridge is another example of the application of the "fourth dimension" in design.

The same solution can and has been applied to bridge girders, he said. In a typical three-span continuous girder bridge, the bending moment diagram for this type of bridge is such that the moments vary from high positive values in

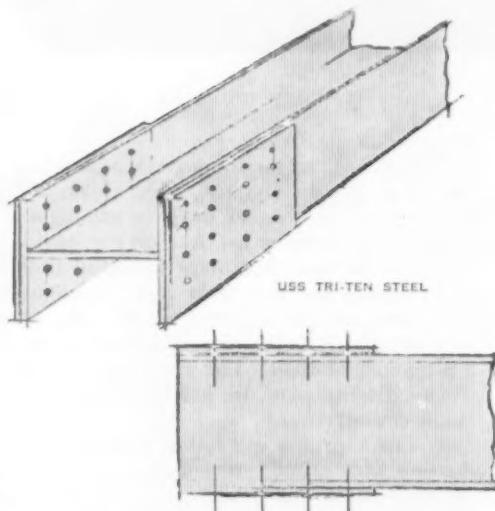


Fig. 1—Tension joint detail, Carquinez Strait Bridge

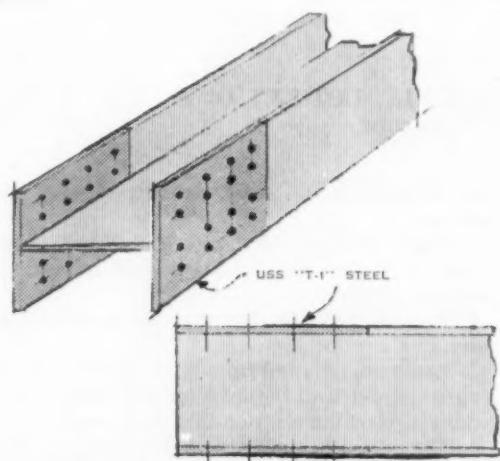


Fig. 2—Tension joint detail, Benicia-Martinez Bridge

the end spans to high negative values over the piers, and to high positive values in the middle span. When the "fourth dimension" in design is not considered, that is, when the girders are made of one grade of steel, girders having varying depth and flange thicknesses to correspond to the varying bending moments are often required.

Varying Steel Choice

"Again, would it not seem practical," said Gilligan, "that the portions of the girders subjected to the highest bending moments be made of the highest strength constructional steel, a heat-treated constructional alloy steel such as USS "T-1" steel. And that the portions of the girders subjected to moderate bending moments be made of a high-strength steel such as USS Tri-Ten. And finally that the portions of the girders subjected to low bending moments be made of structural carbon steel?"

This is precisely what was done in the design of the Whiskey Creek bridge in California, he said. In this bridge, (Fig. 3) the cross sections of the girders are uniform throughout their length except for a part of the length of the suspended-span, where the flange thicknesses were increased by $\frac{1}{4}$ in. Otherwise the flanges have the same width and thickness and the web has the same depth and thickness throughout.

In addition to the savings in the cost of the steel required for the girders, the application of the "fourth dimension" resulted in reduced fabrication costs, reduced maintenance costs, the elimination of stress concentrations caused by changes of cross sections; and, lastly, in improved appearance of the structure, according to Gilligan.

In the design of beams or girders, it is normally assumed that the flanges and the web are made of similar strength material. Exceptions to this are in girders where different strength steels may be applied to correspond to the stress gradient in the beam, Gilligan pointed out. (Fig. 4). It will be noted, he said, that material near the neutral axis can be made of a structural carbon steel, such as A36 steel. And material in the higher stressed portions, more remote from the neutral axis, can be made of a higher strength steel such as A441

steel or even USS "T-1" steel, the different steels being joined in the web with horizontal butt-welds.

Flanges and Beams

The foregoing are examples of the application of the "fourth dimension" in design based on elastic behavior of beams. A somewhat different approach to the design of beams now gaining acceptance applies a higher strength steel in the flanges and a lower strength steel in the web of a beam. Gilligan said that, to his knowledge, the first application of different strength steels in the flanges and web of a beam was in the main frame members of flatbed highway trailers. The main longitudinal members of flatbed trailers offered by several manufacturers are currently being made of a heat-treated constructional alloy steel such as "T-1" or "T-1" type A steel in the flanges, and a high strength steel such as Tri-Ten or Cor-Ten steels in the web.

Gilligan referred to one trailer currently on the market and constructed in this manner which weighs only 8,500 lb. but supports a payload of 50,000 lb. The application of the different steels in the frame members of this unit resulted in a 1,500-lb. saving in weight over a previous design for a similar capacity trailer having frame members made of a high strength steel.

When supporting rated loads, the above frame members behave elastically; that is, the maximum stress in the web does not exceed 50,000 psi. The frame members are adequate and will continue to behave elastically even when the trailers are periodically subjected to overload conditions.

Prestressed Steel Beams

The principle of prestressing structural members is not new; its use in conjunction with concrete is well known and the principle has been applied in steel construction to a limited extent. The following, said Gilligan, represents an interesting application of the "fourth dimension" in design in the prestressed steel beams in a highway bridge.

The Iowa State Highway Commission recently let a contract for a 240-ft.-long by 30-ft.-wide continuous prestressed steel I-beam bridge.

Continued on page 97

Syracuse Constructors, Inc., Report on Almasol

(Performance Study #262)

*Lubricant Life Extended Twelve Times —

Bearings on asphalt batch plants operated by Syracuse Constructors, Inc., Syracuse, N. Y., such as shown below, are subjected to severe heat and pressure. So severe, in fact, that ordinary lubricants had to be replaced every hour.



In July, 1959, the Syracuse Asphalt Plant Superintendent, Ray Havens, changed to ALMASOL 1225 BEARING and CHASSIS LUBRICANT — and lubrication intervals were extended to twelve hours, with a wide margin of safety!

*Gear Oil Lasts Full Year Without Make-Up —

Furthermore, ALMASOL 608 GEAR LUBRICANT was installed in three particular trucks, previously needing from three to five pounds of gear oil every week. These vehicles ran one full year without any make-up oil, thanks to the frictional heat resisting action of ALMASOL 608. This was a saving of between 156 and 260 pounds of gear oil which ordinarily would have evaporated away, in just three trucks!

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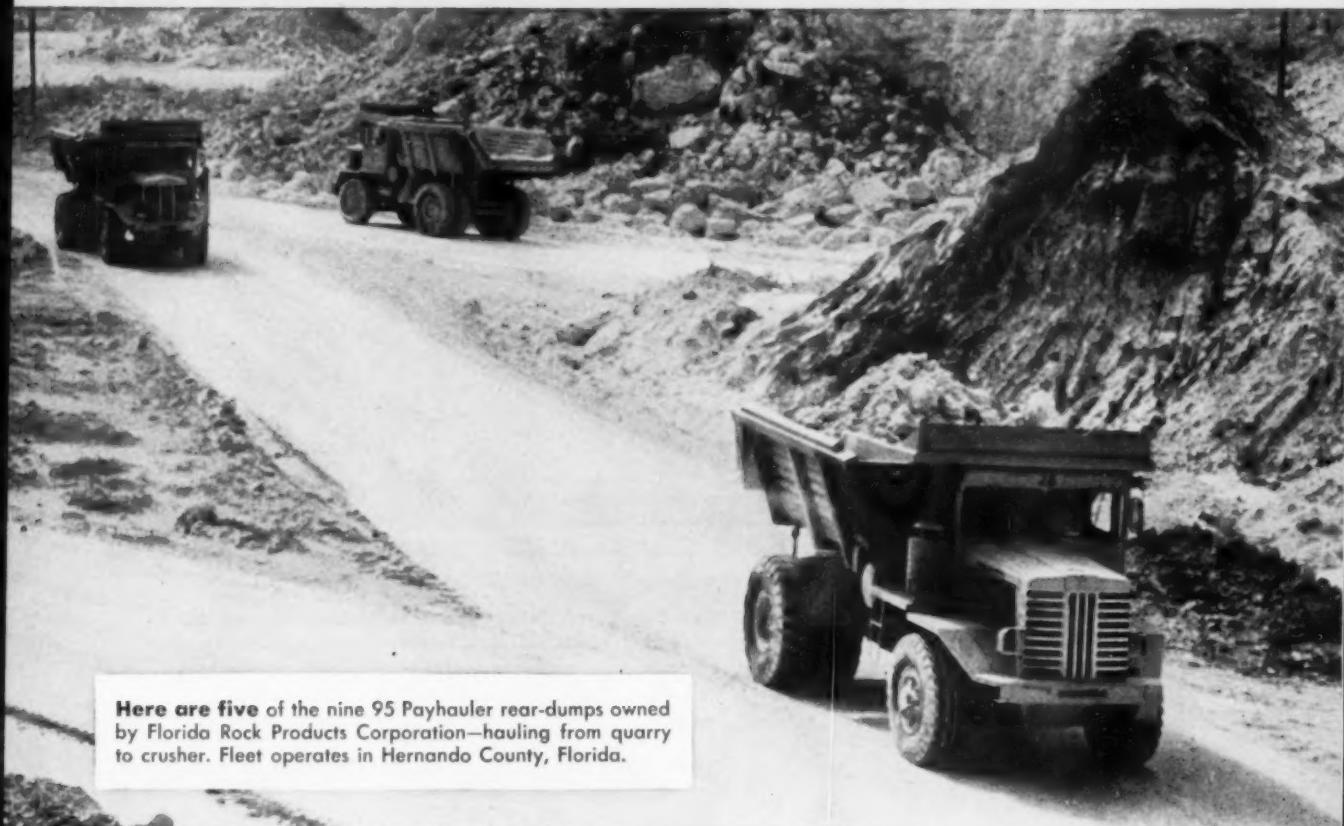
Nine-Unit Payhauler fleet serves



Eleven-second dumping with positive power-up, power-down control of body action is provided by the inverted, double-acting hoist system as furnished by International. For similar all-around cycle-speeding advantages in a 19-tonner, see the 65 Payhauler!



Florida Rock Products Corporation



Here are five of the nine 95 Payhauler rear-dumps owned by Florida Rock Products Corporation—hauling from quarry to crusher. Fleet operates in Hernando County, Florida.

"Our Payhauler units are doing everything we expected of them—and are performing very satisfactorily."—T. S. BAKER, President

Florida Rock Products Corporation

Florida Rock Products Corporation moves rock from quarry to crusher with a fleet of nine International Model 95 Payhauler rear-dumps. Payhauler offers an exclusive combination of capacity-adding, cost-reducing features of special appeal for tough, heavy, off-road mine and quarry hauling.

Of all 27-ton off-road haulers, only the 95 Payhauler gives you the ton-shedding, brawn-boosting advantages of the rock-ribbed corrugated body. Only the "95" is plus-powered by the 375-hp DT-817 turbocharged International diesel engine. Choose the "95" with power-shift torque converter or 9-speed air-shift transmission.

Grade charts prove that the "95" Payhauler is in a class by itself for upgrade hauling—giving a speed advantage of up to 44%! Compared to 27-ton competitors, only the "95" is "one hand" power-steered with International's high-leverage enclosed system

—or is quick-dumped (in 11 seconds) with power-up, power-down inverted hoist action.

See for yourself in your own off-road hauling how an International Payhauler can increase your capacity, and give you record economy. Let your International Construction Equipment Distributor demonstrate.



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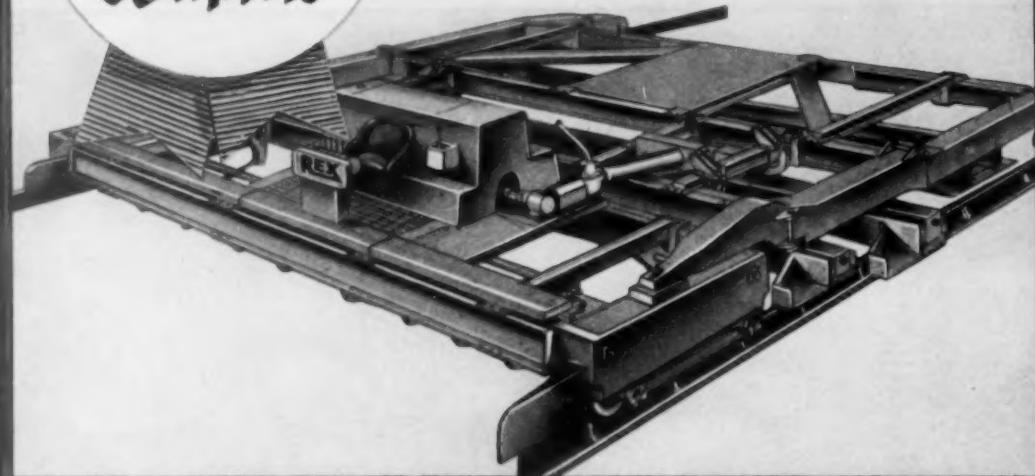
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180 North Michigan Ave., Chicago 1, Illinois
A COMPLETE POWER PACKAGE

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ROADS AND STREETS, June, 1961

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Profit Winners



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Rex Slip-Form Paver—The remarkable performing machine that needs no road forms—while single-handedly combining the complete concrete spreading and finishing operations at a continuous, rapid rate. Ask about it!



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Assure yourself bid-winning and profit-building advantages—re-equip now with Rex! Talk to your Rex distributor now or write for catalogs. CHAIN Belt Company, 4652 W. Greenfield Ave., Milwaukee 1, Wis. In Canada: REX CHAINBELT (Canada) Ltd., 1181 Sheppard Ave. East, Toronto. Distributors in all principal cities of the world.

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CONSTRUCTION MACHINERY

"Motorola 2-way radio pays for itself in less than a year"



Radio control of widespread operations pays off for Cleveland-Trinidad Paving Co.

What happens when equipment breaks down, or when you need material at the job site? You lose valuable time—perhaps several hours. Not at the Cleveland-Trinidad Paving Co., though. They just pick up the mike on their Motorola 2-way radio—and help is on the way in minutes. Victor Smukler, their General Manager reports that in everyday operations Motorola saves hundreds of dollars in wasted time, gas and oil formerly spent backtracking and phone hunting. He points out that with Motorola, one Supervisor does the work of several just "making the rounds." And customer relations have improved, too—because contractors can get in touch with key personnel fast. You've probably considered 2-way radio for your firm. There's no better time than now to get the facts. A Motorola radio specialist is waiting to help. Mail the coupon today.



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- Mail me full fact kit on 2-way radio
 Have representative telephone for appointment

Name _____ Title _____

Company _____ No. of Vehicles _____

Address _____ Phone _____

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The new road along Quebec's lower north shore crosses innumerable streams near their point of entry into the parallel St. Lawrence Gulf.



The most valuable piece of equipment on the job was this decommissioned military landing craft.

'Rough and Tough'

Road Building Along Quebec's North Shore

Highway contractors in both the United States and Canada will find an absorbing adventure story in the road work along the St. Lawrence River's north shore. These notes tell something of the challenging problems encountered in constructing a 150-mile segment of this 435-mile road, Provincial Highway 15.

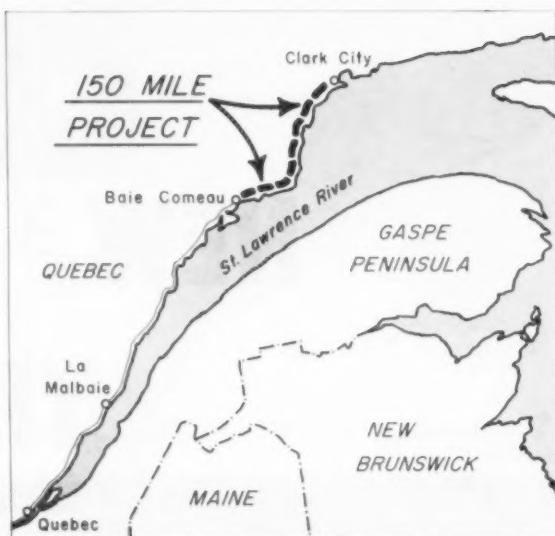
The entire length from Quebec City to Sept Iles was opened to traffic by late 1960, with formal dedication scheduled for the 1961 spring. The 150-mile section here described is an 8-part project costing \$18 million, begun in 1952 and completed last December. Highway Paving Company, of Montreal, was the contractor, with F. DeGrandis the general superintendent.

First a word about this part of the world. The rugged north shore of the lower St. Lawrence heretofore has been accessible only by air and water. In locating the highway the engineers had to run the line across muskeg swamps, around and sometimes over cliffs, often skirting the St. Lawrence in a scenic route that will increasingly attract tourists as well as the settlement of wayside industries.

Heavy timber, long winters with deep snow, and torrential rivers added to the problems of the contractors. The first problem was to bring in men, supplies and equipment including a portable aggregate plant. This meant a 500-mile water transport from Montreal to Shelter Bay. For this move-in and a succession of moves, the company utilized a decommissioned LCT, the "Sara B." This sturdy landing craft was driven up on the beach at high tide, unloaded and refloated when the water rose again.

A main camp was established for 200 men, and the work of clearing and burning of the right-of-way begun. Stumping was done with heavy tractors, working double-shift six days a week from May to December, when snow depth stopped the work.

Roadbed construction involved heavy road excavation, earth grading, and swamp removal or bridging over with fill or structures. Actually two roads had to be built much of the way—one as a tote road or access road. Tote road traffic by four-wheel-drive vehicles was continuous, getting explosives "up front," shifting men and equipment and supplies. Camp sites were



How Quebec's new Provincial Highway 15 skirts the St. Lawrence shore through a heretofore inaccessible area.

shifted every six miles by tractor and truck.

Fueling the advance equipment in rough terrain, alone, was a major job that had to be planned with care. A 1,500-gal. truck refueled equipment that was accessible. Skid-mounted 300-gal. diesel tanks were dragged to isolated equipment by tractor.

The heavy roadbed design had to conform to modern standards that would insure a stable foundation through muskeg, and endure the deep frost of the often-50-below-zero winters. The terrain was thoroughly studied by the advance engineering parties, and materials suitable for embankments and subgrade located, as were materials for crushing plant sites for the base and paving.

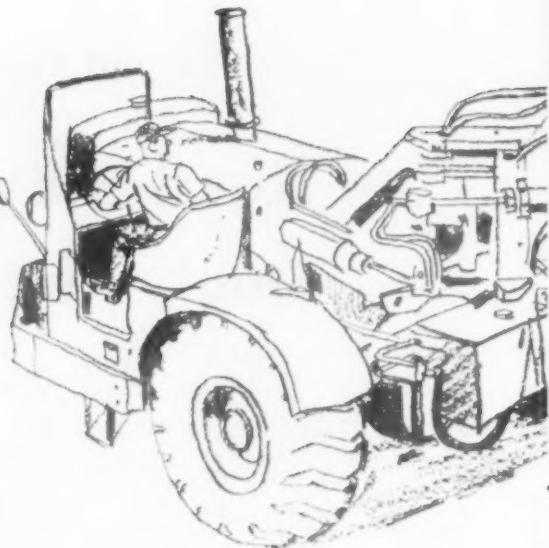
The company's aggregate production equipment consisted of a Cedarapids #2540 jaw for primary

Continued on page 78

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NEW *ATHEY* TRAILERS . . . bonus



PW631 BOTTOM DUMP
45 ton (30 yd. struck) capacity
T-1" steel body • 3 door dumping
High maneuverability

PR619 REAR DUMP
New 27 ton capacity
Turns in 28'9" • Speeds to 30.2 mph.
"T-1" steel construction

PH630 COAL HAULER
60 ton (85 cu.yd.) capacity
Haul speeds to 41 mph. • Long, wide, low design
Gives rock-steady stability.

Each new Athey trailer is designed and built to give better performance than comparable sized units. Pound for pound they're tougher, stronger and built to do a man-sized job.

You get tough "T-1" steel construction for bonus payloads. "T-1" eliminates profit robbing dead weight . . . gives increased capacity without increasing gross weight or reducing performance.

Other new Athey features include constant running gear type pumps; flared, open-mouthed bodies with low slung design for efficient shovel loading; clean, trim, straight-line body design for fast discharge of any material.

That's not all. New Caterpillar® 630 and 631 Tractors have 420 horsepower and power shift transmissions. 9 speeds with 3 shifts and no clutch! Power to spare!



payloads, high speed performance, new power!

PW630 BOTTOM DUMP
48 ton (32 yd. struck) capacity
3 door dumping • "T-1" steel body
Speeds to 41 mph.

PR631 REAR DUMP
40 ton capacity
"T-1" steel body • Turns in 34'
Speeds to 31 mph.

PR630 REAR DUMP
40 ton capacity
Speeds to 41 mph. • "T-1" steel body
Excellent roadability

See these new super haulers... compare them... find out what real hauling performance means... at your Athey-Caterpillar hauling headquarters. Write for details. A big new booklet gives the facts about Athey's new high capacity trailers. See why they will move more material faster. Request "PAYLOAD... POWER... PERFORMANCE!"



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ROADS AND STREETS, June, 1961



Drillers here didn't have to worry about jarring neighboring houses. This location is far from the nearest habitation.

QUEBEC'S NORTH SHORE

Continued from page 75

crushing, and another tandem crushing and screening plant for secondary reduction.

This equipment was assigned to locations after government geologists made an aerial reconnaissance. This plant with 25 to 30 trucks were relocated at intervals averaging 15 miles. Gravel deposits were found for all areas except one, which necessitated opening up a quarry operation.

For long stretches of the road, loose sand was a

particular problem. Stabilization of the top 6 in. of the grading was done with a pulverizing mixer using clay as an admixture. Then a 15-in. thick crushed gravel base was placed throughout, including 3-in.-maximum crusher run for the first 8 in. and 1-in. crushed for the remainder, compacted by pneumatic rollers.

Muskeg as deep as 100 ft. was encountered. Shallower swamp areas were draglined out and filled with

Scores of streams were bridged with logs for the advance tote road.



After blasting, heavy equipment moves in. Over 40 trucks of various sizes, 8 heavy shovels and 16 tractors were continuously employed. Shown are a Cat D9, 5-yd. Koehring Dumper, and a Koehring 24 shovel.





A Northwest shovel loading Koehring Dumptors in one of the larger rock cuts.



Wagon drills (Ingersoll-Rand) were used for much of the drilling work in remote hilly terrain.

Major Equipment Which Helped Carve New Quebec Highway

Tractors:

2 Caterpillar D9s, 13 D8s, 1 D4

Shovels:

2 Northwest 80 D 2½-yd.; 2 Northwest 1½-yd.; 2 Koehring 1½-yd.;
2 Northwest ¾-yd. (used as backhoes)

Compressors:

14 ranging from 110 to 600 cfm.

Aggregate Plants:

Cedarapids Master Tandem, 3,500 tpd for 3-in.
gravel; Secondary
2,000 tpd for 1-in. size.

Trucks:

6 Macks, 25-ton
28 Dump trucks
12 Koehring Dumptors
9 F-W-D four-wheel-drive trucks (6 with dump
bodies, 3 service trucks)
3 Ford service trucks for maintenance

Rollers:

3 Richardson units

Graders:

Several Cat 12s

Scrapers:

Various, LeTourneau-Westinghouse

sand. Where the bog was too deep for removal, corduroy was laid over it. "We got so used to this kind of thing that when we found a ¼-mile-long bottomless peat bog in our way, we just cross-logged it and poured in pit-run gravel," the superintendent said.

Hill sections also had their difficulties. Several times a shovel was "walked" four or five miles. On especially steep inclines, shovels were push-pulled, a Cat D8 pulling and a D9 pushing. Drillers on pioneer work, 100 ft. up a sheer cliff, tied themselves to trees for safety while they worked.

Water fording required ingenuity. There were 25 rivers to be crossed, in all, ranging in width from 40 to 400 ft., and innumerable torrential smaller streams. Where it was possible, lumber was cut and temporary bridges erected—later replaced with permanent structures. Several rivers were forded by laying steel corrugated pipes, up to 15 ft. in diameter, and then filling in.

Where rivers couldn't be spanned, a tote road was constructed to the nearby St. Lawrence and the Sarah B used to move 2½-yd. shovels, heavy tractors, 26-ton trucks, explosives, men and supplies. After disembarking this equipment, another road would be built back to the work route. It was often necessary to blast both down and back. "Loading and unloading huge equipment against almost sheer granite walls and beaches full of boulders, is quite a ticklish proposition," was superintendent De Grandis' understatement.

The nastiest problem? All hands on this job agreed that it was getting the road built across an 800-ft. length of liquid clay 120 ft. deep. The first crossing



The white expanses are wide sand fills blanketing over swamps. One such fill was 120 ft. deep.

attempt resulted in a landslide carrying both men and equipment. "Fortunately we rescued both!"

Counterbalancing the roadbed with sand and gravel counterforted on each side to a 15 percent transverse slope solved this problem. Material was allowed to settle for two years, and in 1961 another 50,000 cu. yd. of gravel will be placed in an attempt to attain stability.

Good drainage was considered absolutely essential throughout the project. Reservoirs as well as ditches were excavated on both sides of the roadbed at many locations. Riprap was placed on the downhill sides of cut slopes, often to a 200-ft. depth to protect fills from erosion. Culverts in the job are full-circle corrugated steel pipes or arches 2 to 15 ft. in diameter.

The last 35 miles, from Godbout to Baie Comeau, were "really rough," said De Grandis. Almost solid rock conglomerate, roughly 60 percent granite gneiss, had to be shot, yielding an average of 15,000 cu. yd. per mile or 600,000 cu. yd.

Approximately 1,200,000 cu. yd. of rock were removed by blasting in the total job. Drilling was done by jackhammers in a 2 or 4 ft. pattern, and by Ingersoll-Rand wagon drills and crawler-mounted units on 6, 7 or 8 ft. patterns with $2\frac{1}{4}$ in. boreholes to 55 ft. depth.

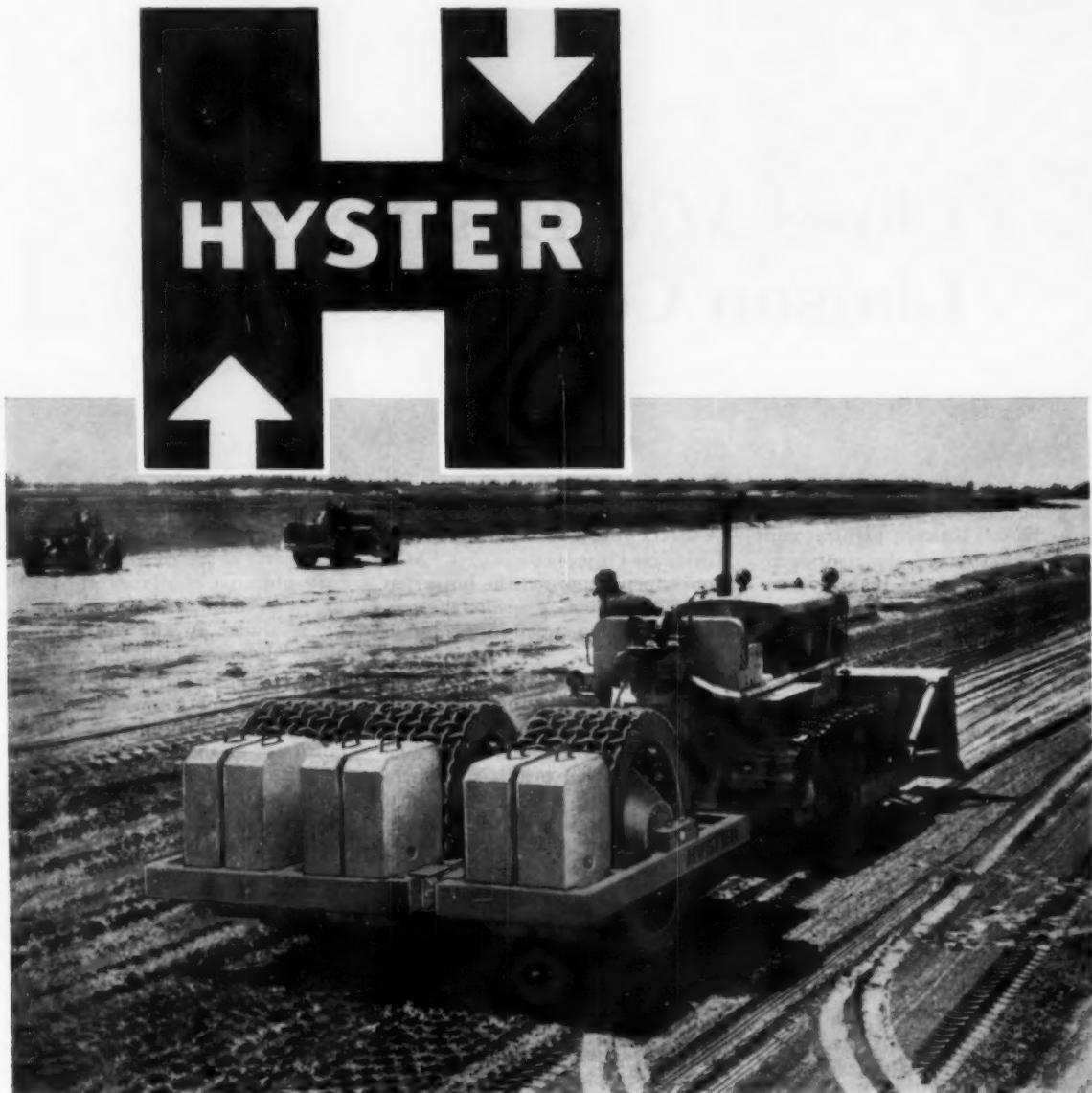
Although original specifications called for a 26-ft. surface, Province officials approved a 32 ft. surface throughout with a 5 ft. shoulder to meet unexpected traffic growth.

The remote location with its long distances to repair shops and supply sources was seen to necessitate unusually careful equipment maintenance. Operators inspected their equipment daily, and service men made weekly lubrication and maintenance checks with



Cleared right-of-way in tote road stage.

unusual care. A large stock of parts and supplies was warehoused on the job, as part of a fully equipped service depot, and two service trucks continuously patrolled the work route. At the end of each season, equipment requiring major overhaul was returned to Montreal and brought back the following spring.



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Another Compaction Development
HYSTER® has it!

New Hyster three-drum Model D "Grid" and Tamping rollers cover 10 feet at a pass—increase production—reduce costs.

Two-drum units already in the field are easily converted to three-drum machines—hinge attachment of third drum frame prevents bridging when rolling uneven surfaces.

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Close AGC-Engineer Liaison Continues

Reflecting the continued close liaison between highway contractor groups and the road agencies, AGC-sponsored highway conferences and also meetings of the AASHO-AGC Joint Cooperative Committee have been held this year at the regional state highway meetings.

In Chicago on March 15 a conference and breakfast meeting were held in conjunction with the Mississippi Valley gathering. C. E. Frisinger, contractor from Ann Arbor, Michigan, participated as regional chairman of the joint committee, with John Swanberg, of Minnesota, president of the Mississippi Valley group and D. H. Bray, of Kentucky, national president of AASHO, present.

In Atlantic City on March 21 similar conferences took place during the North Atlantic highway meeting. Here William R. Hellwig of White Plains, N.Y., represented the AGC as regional co-chairman with New York superintendent of public works J. Burch McMorran, on hand as the North Atlantic group's president.

Similarly in Las Vegas on April 25, a conference and joint committee meeting took place. At all three meetings national co-chairman W. Ray Rogers, contractor, Portland, Oregon, was on hand, and also Rex M. Whitton, Federal Highway Administrator, and M. Clare Miller, national president of AGC.

In emphasizing the value of joint meetings such as these, and in expressing appreciation for them, the AGC complimented the American Association of State Highway Offi-

cials on the publication of the AASHO guide, "An Informational Guide on Project Procedures." AGC spokesmen expressed the hope that the states would adhere to the procedures recommended in this publication.

Points where the paths of interest of highway contractors and engineers meet are reflected in the agenda of these joint conferences. The subjects that were discussed are here briefly reviewed, from reports issued by the joint secretaries, A. E. Johnson, AASHO's executive secretary, and J. M. Sprouse, AGC's highway contractor division manager.

National Highway Legislation.

Optimism for new federal financing was expressed. Representatives of both the contractors and the highway officials voiced concern regarding the findings of the Congressional committee investigating the highway program, and said that contractors must bear their full share of responsibility for constructing highways in a manner which will reflect credit to all concerned.

Responsibility for Quality Control.

AGC President M. Clare Miller emphasized that, to assure public acceptance of the highway program, contractors must recognize and assume their responsibility for workmanship of the very highest quality. If this is not done, the industry exposes itself to even more charges than have already been leveled.

President Miller expressed his belief that prequalification is one of

the best means for assuring quality control. He re-emphasized earlier statements of the AGC that the ultimate objective of all concerned with highway construction must always be assurance to the public of a good "dollar's worth" of construction.

Speaking on this same subject, George M. Williams, assistant commissioner of the Bureau of Public Roads and a member of the joint committee, expressed his appreciation for the attitude of AGC highway contractors on the revised inspection and testing procedures of the Bureau.

It was also pointed out that common sense and sound engineering judgment must always be exercised in seeking quality control, and that too much attention to inconsequential details might well result in losing sight of the objective of end results of the highest quality.

Experimental Highway Projects.

Contractors should support this work with suggestions for particular projects. Highway research should be a cooperative effort, including contractors as well as highway departments.

Keeping Up With Specification Changes.

Delegates agreed on the need for contractors and engineers to be thoroughly familiar with specifications. Contractors and their employees should devote more time to examining the specifications. The state highway departments could improve their procedures for in-



Seen at AASHO-AGC Joint Cooperative Committee Meeting held March 22, during convention of Association of Highway Officials of the North Atlantic States, Atlantic City: M. Clare Miller, President, AGC, San Ore Construction Company, McPherson, Kansas; G. M. Williams, Assistant Commissioner for Engineering, U.S. Bureau of Public Roads, Washington, D.C.; J. Burch McMorrin, President of Association of Highway Officials of the North Atlantic States, Albany, New York; William R. Hellwig, Regional Co-Chairman, AASHO-AGC Joint Cooperative Committee, Peckham Road Corp., White Plains, New York; W. R. Rogers, Co-Chairman AASHO-AGC Joint Cooperative Committee, Rogers Construction Company, Portland, Oregon; A. E. Johnson, Executive Secretary, AASHO, Washington, D.C.

forming and educating their employees, it was said.

In many states regular meetings between highway departments and the contractors are held, at which time this subject is discussed at length. It was generally agreed, however, that there is room for, and need of, improvement.

Prequalification.

Discussion of this subject resulted in reaffirming the fact that both contractors and highway officials favor prequalification. The contractors felt that stricter prequalification measures would probably create better costs and workmanship.

End-Result Specifications.

This approach is slowly gaining more favor, but it was agreed that its advocacy should not be rushed or emphasized too heavily. Basically, what the contractors ask is for the state highway departments to tell the contractor what is wanted, but not to do so by using method-type specifications. The contractor should be allowed to use his own methods, equipment and ingenuity to the fullest extent. This does not mean, however, that the contractors want to lessen current inspection to any degree.

Delays in Final Clean-Up.

Reports were received on some contractors who delay in final cleanup of the job because they wish to place their work force on other operations of higher productivity. This often results in delays in opening projects, with attendant difficulties. It was the opinion of the contractors that in these cases the offending contractor should be penalized, to the fullest extent possible under the contract and the laws.

Supervision of Subcontractors.

The laxity of some general contractors in supervision of their subcontractors was brought to the attention of the meeting. The contractors and state highway departments agreed that the states should not have to deal with, or supervise, the activities of the subcontractor. This is the responsibility of the general contractor.

Compliance with Subbing Regulations.

Subcontracting limitations on Federal-aid highway work was again discussed. The AGC repeated its belief that the current 50 percent limitation should be retained and rigidly enforced.

Discrimination in Employment.

Michigan representatives described recent procedures invoked in that state which require contractors to list all employees on their projects for the past three years, their rates, race, and the contractors' experience in working negroes. No other state has been confronted with this situation, although the Anti-Discrimination Executive Order issued by President Kennedy is being enforced on direct Bureau work.

Designation of Haul Roads.

This problem arises in areas without rail facilities, and also where local authorities refuse contractors the use of the roads or post them with unrealistically low limits. The problem becomes particularly acute when the state designates the borrow pit and the haul road, and the contractor desires to use other sources and other haul roads.

The question of BPR participation in the cost for maintenance and repair of haul roads was again discussed. The Bureau has this question under consideration and hopes to arrive at a satisfactory solution.

Continued on page 90

Another FIRST from Esso Research...

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*Viadon**

for permanently colored pavements that open up new horizons in design!



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for colored pavements requiring high resistance to fuels and oils!

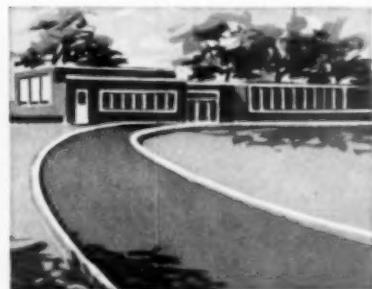
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PROMOTES HIGHWAY SAFETY: Can be used to set off speed zones, stop streets, crosswalks, safety islands, and turn-offs at cloverleafs.



INCREASES PLANT EFFICIENCY: Makes light-colored, high-strength flooring; distinguishes danger zones, exits, assembly areas, etc.



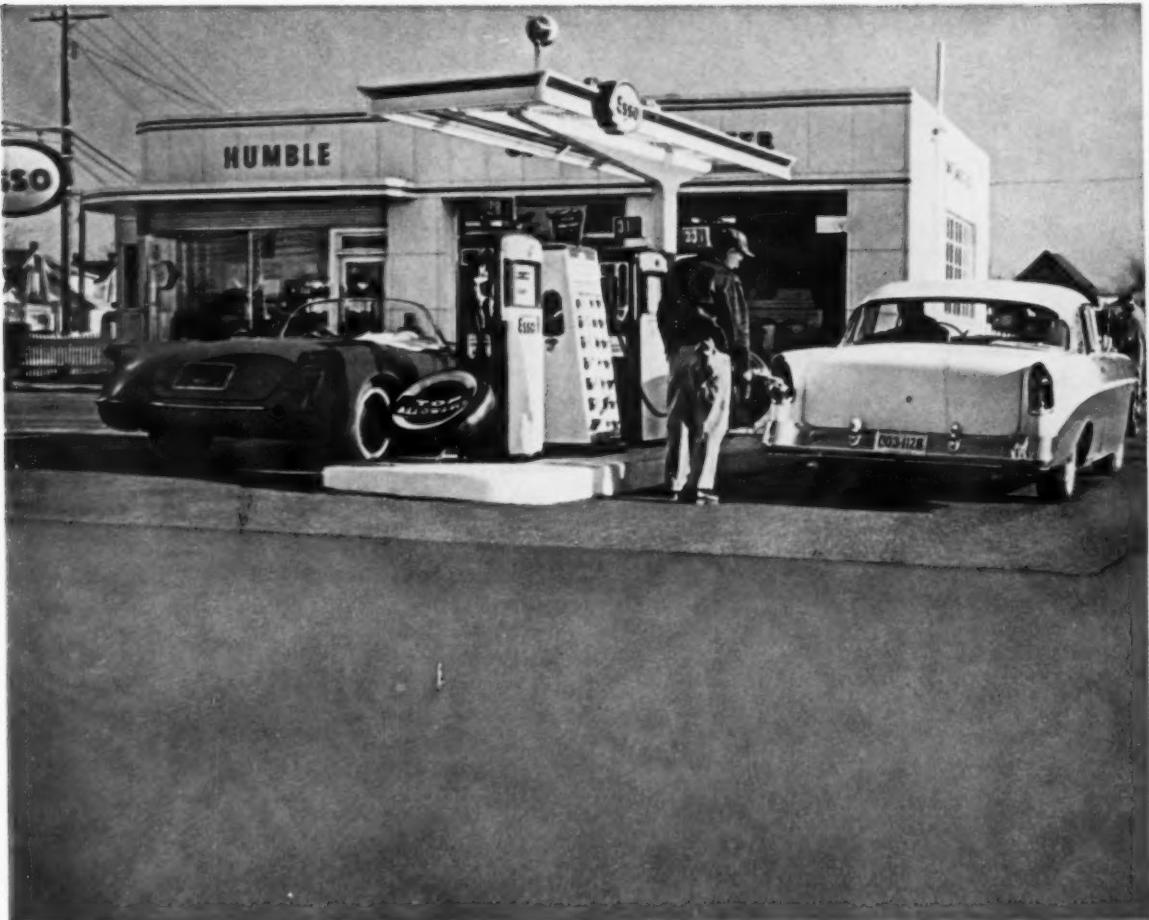
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Today, color is everywhere — serving all kinds of decorative and functional purposes. Why not on pavement, too... permanent color mixed into the pavement to stay in as long as the pavement lasts? Esso Research now announces the answers: VIADON and MIRADON!

These remarkable new materials make colored pavement a practical reality. The color is built in. It

cannot wear off. Either material can be mixed in a standard asphalt pugmill and both can be laid with existing construction equipment. Resulting surfaces are able to support heavy traffic on roads or runways.

Applications are almost limitless! Shopping centers, parking lots, driveways, playgrounds, tennis courts, patios, and pools can now be surfaced in pleasing



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ALL-PURPOSE MATERIAL HANDLER

NOW—the *all-purpose* material handler that gives you one-man crew advantages. It's the soundest investment of all for your requirements because it does *all* the jobs...earns its way on one application after another. And its usefulness is multiplied to the extent that it replaces single-purpose, specialized equipment!

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Example: shown above, the Speed Swing backfills a sewer trench. The

180° boom swing permits it to work parallel to the trench in a confined area with no gee-hawing or maneuvering of the machine. Traffic is not disrupted...can move safely in other lanes. Other applications are numerous: park and street maintenance, tree removal, culvert installations, loading and spreading materials with high speed operation, loading out old curbing and sidewalks, snow removal—to mention a few. And all on a cost-cutting operation basis. Shown at right, 10 quickly interchangeable attachments (by changing *only* 3 pins) that make the Speed Swing the *most adaptable, most versatile* all-purpose material handler of all!

Get the facts on how the Pettibone 180° Speed Swing can reduce your equipment investment, as well as your maintenance costs.

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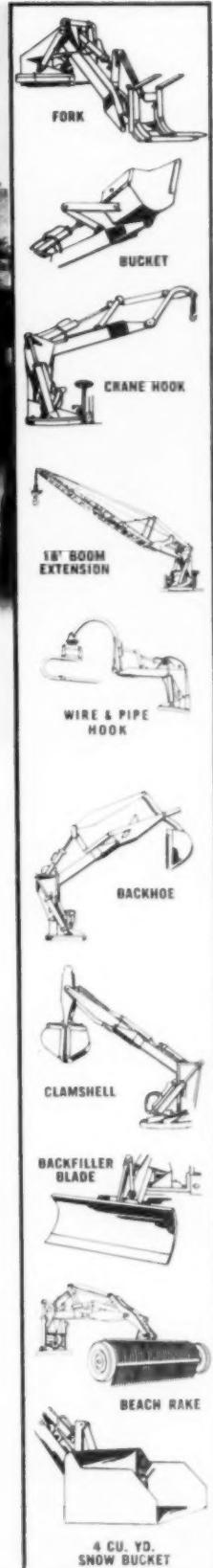
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86



ROADS AND STREETS, June, 1961



HOW TO MAKE A FREEWAY LIVE TO A RIPE OLD AGE

give it the strength of LACLEDE STEEL REINFORCEMENT

Practically every metropolitan area has experienced a phenomenal growth of its suburbs. More than ever before, high speed expressways are needed to carry an increasing volume of traffic to and from the downtown area.

Expressways now a-building will help meet this critical need, and will get plenty of use in the years ahead.

In anticipation of this heavy work load, many new freeways are being fortified with tough sinews of steel—Laclede steel reinforcement. Laclede offers a complete selection of the finest highway steels to add strength and durability to concrete streets and bridges: welded wire fabric, dowel spacers, multi-rib bars, prestress strand and other types of reinforcement. These Laclede products are produced in Laclede's own mills under carefully controlled manufacturing processes to assure the highest possible quality and uniformity.

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SAINT LOUIS, MISSOURI

Contractor on the section of the Mark Twain Expressway in St. Louis shown above was Fred Weber Contracting Company, St. Louis.



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REPLACES 4 TO 7 MACHINES



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ALL-PURPOSE MATERIAL HANDLER

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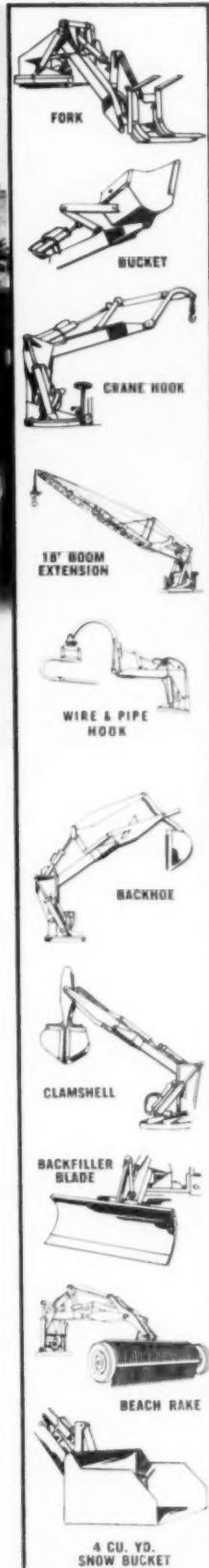
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FOOD FOR THOUGHT ... IN SOLID ROCK!

Don't try to eat this "food"! The steak is petrified wood, potatoes are quartz, cauliflower is howlite, rolls are sandstone concretions. The prunes are obsidian nodules, the avocado is agate, and the cheese-cake is satin spar on onyx.

This dinner of rocks is part of a collection of Mrs. Erna Clark, Redlands, California, who, like any aggregate producer, has hunted for suitable rock all over the country. The difference between Mrs. Clark's hobby and your business is that *you* need crushing, mixing or paving equipment that makes *your* rock collection fatten your bankroll!

Think about your equipment... your competition...

YOUR PROFIT'S AT STEAK!

Whether you spell it steak or stake, profit is the meat of your business. Getting on the gravy train depends on equipment that can handle the job economically — on what your competition is doing — and on YOU.

Years ago a customer in Texas wrote, "I wish you'd quit selling Commanders to contractors in my neighborhood. The only real competition I have around here is other Cedarapids plants."

Chew that over awhile. Then digest this thought . . .

Throughout the years, Cedarapids owners have learned by experience that Cedarapids equipment out-produces and out-economizes any other. Know why? Because Cedarapids

has always been first in developing and introducing equipment that meets increasingly difficult requirements with increased production and no beefs about maintenance.

When you own Cedarapids equipment you are three to five years ahead of your competition in low-cost production. And you are the one who keeps eating high on the hog with the greatest profit.

THAT'S FOOD FOR THOUGHT!

Cedarapids
Built by
IOWA



Portable Aggregate Plants and tandem crusher plant design were born at Cedarapids, and put big-capacity crushing on wheels for mobility to move with the job and bring profitable production to the job site. With this lead in the race to give contractors ever better, more productive equipment, Iowa Manufacturing Co. researched and engineered, developed and improved crushing plant design to its present unequalled Cedarapids standard of efficiency and economy.

Cedarapids Twin Jaw Crushers have been giving contractors 40% to 100% greater primary crushing capacity for the past seventeen years... years of extra profits for Twin Jaw owners! This time-proved unit is stepping up output in Super Commander Plants (above) and other Cedarapids models. Now, the two-movable-jaw principle is no longer a Cedarapids exclusive. Other equipment manufacturers are following our lead, while Cedarapids engineers are working on revolutionary products for the future.

Cedarapids Horizontal Vibrating Screens have been first choice in the industry for 25 years, because horizontal screen design gives 12½% more effective screening area, 30% higher capacity, and much greater accuracy in grading specification sizes. After profit-conscious contractors began to expect the advantages of better screen performance in portable as well as stationary plants, which only horizontal screens could give, other equipment manufacturers again followed our lead.



Bituminous Mixing Plant all-automatic design with true weight proportioning is the result of experience gained since 1946 when Cedarapids first equipped batch-type plants with semi-automatic controls for faster, better bituminous mixing. Cedarapids was also first to cut between-job delays with a 100% portable and self-erecting batch-type plant. Though other manufacturers have followed, Cedarapids still leads in the many other profit-proved batching, mixing and drying advantages that assure extra batches per hour for extra earnings per year.



Cedarapids Bituminous Pavers brought another profit-first to paving contractors. The Cedarapids Paver is the only such machine that lays inspector-accepted mat at 102 fpm; the only paver with a high frequency vibrating screed; the only paver so automatic it almost operates itself. And maintenance costs are exceptionally low. When you own a Cedarapids Paver, your only competitor is another Cedarapids owner... and you'll have this profitable advantage until Cedarapids patents run out and other manufacturers can follow our lead.

AGC-ENGINEER LIAISON

Continued from page 83

Changed Conditions Clause.

It was generally agreed that a changed conditions clause in state highway contracts would be a valuable tool for properly adjusting changes which neither side can anticipate in advance. Contractors expressed their approval of the changed conditions clause contained in the Standard Government Construction Contract used by the BPR on its direct work. They feel that this clause is conducive to clearer, better defined operations all around. The AGC will continue to advocate the use of a changed conditions clause by state highway departments.

Unbalanced Bidding.

In some states a bid which the engineers feel is unbalanced is considered irresponsible and is rejected. The contractors pointed out that there is a difference of opinion on the unbalancing of bids. The contractor must recover heavy costs early in the job to cover his move-in, plant set-up, bond, etc., and these costs are usually put in the clearing and grubbing items performed early.

The highway officials here noted that there is no such thing as a perfectly balanced bid, and that those states which have strict prequalification measures and adequate competition are not concerned about unbalancing. While each contractor bids a job differently, the state should be more specific regarding quantities, which should be rounded as little as possible.

Relocation of Utilities.

New York reported that through its special committee between the highway department and utility firms, this problem has been almost completely overcome. It was agreed that the earlier the utilities and the state highway department can meet on relocation of utilities, the easier this problem can be handled.

The procedure used in California was also described, where the resident engineer is assigned to the project several weeks in advance to work with the utilities. The result is that in almost all cases the utili-

ties are removed by the time the contractor begins work.

Davis-Bacon Provisions.

The AGC reported the following Davis-Bacon problems of serious concern to the highway construction industry:

1. The Labor Department's inclusion in Highway Wage Predeterminations of classification of laborers and mechanics which have not been requested by the highway departments and which have no reasonable relationship to the kind of work to be performed. Examples: The inclusion of survey crews which include professional engineers; the inclusion of plumbers in cases involving highway grading, paving and similar work, unrelated to the use of plumbers.

2. Pending legislation to extend the application of the Davis-Bacon prevailing wage requirements to the ABC system.

3. Pending legislation to expand the contents of wage predeterminations, now applicable to Federal highway and Federal-aid Interstate highway construction, to include welfare, pension and other fringe benefits.

4. Pending legislation to require overtime after eight hours a day on Federal-aid work. (The Eight-Hour Law now only applies to direct Federal construction.)

Traffic Protection.

It was agreed that this subject, which has a direct bearing on public relations, could be better handled by the contractors, particularly by the use of uniformed flagmen rather than employees found unsuitable for any other occupation. The system in use in Oregon was described where the state and the contractor share flagging costs on an equal basis.

Moving Overweight Equipment.

There should be closer liaison and cooperation between state highway departments and contractors in the movement of overweight or oversize equipment. It was suggested that pre-job conferences might help, and also more complete data in bidding information would be helpful.

Labor

Common Site Picketing Bill Will Revive

The common site picketing bill to permit secondary boycotts at construction sites reached the floor of neither houses in the last Congress. But because secondary boycott power is the key aim of AFL-CIO unions, the U.S. Chamber of Commerce predicts that efforts to pass the bills will be made in the next Congress.

Arguing against the bills, the Chamber cited that construction occurred in the last unions had hindered national defense with 30 secondary boycotts at missile sites, defense bases, and AEC installations. Most boycotts occurred in the last two years. On 23 occasions the unions delayed construction at ballistic missile bases and development centers. The Chamber said that it conducted its own survey.

Another survey conducted by the Air Force shows that about 36 secondary boycotts by construction unions occurred in the 12 month period July 1959-June 1960 at air bases and missile sites.

Secondary boycotts against road builders and heavy construction contractors—most often at missile bases—showed up in the surveys.

At previous sessions of Congress, both President Eisenhower and Secretary of Labor Mitchell had supported the Common Site Picketing Bill. But at this last session neither did. Washington reporters are speculating that the outbreak of secondary boycotts at vital missile bases angered the President.

Pay Raise Given Cement Finishers

Members of the Associated General Contractors' Rhode Island Chapter agreed in a three-year contract renewal to raise hourly pay 15 cents each year. The first hike carried the rate to \$3.70 an hour. The union can divert any part of subsequent raises to a health-welfare plan.

PRECISE SPECIFICATIONS HELD EVERYBODY

Continued from page 55

"... to be adjusted by the Engineer in the Field."

The writer should guard against omissions or contradictions in the specifications, which may affect the bids considerably. Sometimes a specification is changed in one place in the specifications and overlooked in another, resulting in contradiction. It is quite easy also to write a plan note which contradicts a written specification. The proposal should always contain a paragraph delineating the priority of such, with plan notes governing over standard specifications and special provisions governing over plan notes.

Rescinding of specifications for contradictory, indefinite or arbitrary reasons, during construction may cause a laxness in further inspection so that the quality of the work is lowered. Such hasty specifications may save the designer's time. But they add to the bid through contingency allowances, and they possibly lower the value received in actual construction. The designer may produce an economical design, then lose this gain in inadequate specifications, controlling quantity in the plans but overlooking quality in the specifications.

Specifications should be written with the inspector in mind as well as the bidder. Ordinarily, inspectors on public works projects are experts in their field. They work with many contractors and observe the best methods of each in the interpretation of the plans and specifications. Construction and material inspection on public works is usually on a daily basis for the regularly assigned inspector, with intermittent additional inspection by supervising agencies, such as County, State, Bureau of Public Roads or Railroads. This method of inspection increases the initial cost of the project but it guarantees quality construction and lower maintenance costs, with a probable lower total cost.

The contractor who is accustomed to intermittent inspection should acquaint himself with the degree of inspection and the rigidity of specifications before bidding on public works projects. If he is

low bidder he would also do well to keep in mind that the resident engineer and inspector assigned to the project are conversant with their responsibilities and the specifications. They are usually willing and able to help him complete his contract to the satisfaction of everyone concerned. Such cooperation is sure to increase the quality of the resultant work; which, again, tends to lower the cost of the improvement.

If there is doubt in the designer's mind as to the correct specifications to use, he should continue with previously accepted specifications, but these specifications should not be copied blindly as conditions in the writer's case may vary from the first case.

The writer should copy specifications verbatim where they apply. Some writers seem to feel they may be guilty of plagiarism if they copy specifications as written and the consequence is confusion due to synonyms describing, in different ways, approximately the same payment item. The specifications of manufacturers and the American Society for Testing Materials are written to be copied in order to standardize specifications.

The practice of uniform specifications and terminology should not be considered as fixing the status of existing construction methods. There is at present a fundamental difference of opinion as to whether specifications should be based on "approved method" or "end product," with no construction method specified. There is the possibility that some method specifications are over-restrictive and that end product specifications would be better.

Without doubt, end product

specifications would permit both contractor and equipment manufacturer freer play of their ingenuity and inventiveness. But innovations are already permitted under many existing method specifications with the approval of the Engineer, but with the contractor liable in case of failure. In these cases, the specified method is retained so that if the innovation does not work out, construction reverts to the original proven method. While a superior contractor may do acceptable work with end product specifications the quality of work done by the less competent contractor may inversely increase the cost of the project.

Public works engineers are not reluctant to change their design or construction methods, as their work of recent years has amply demonstrated. But unless the construction innovator is willing to stand the expense of the innovation if it fails, the public works engineer stands liable to a charge of wasting public funds, due to such failure. Probably the solution is to allow end product specifications on smaller projects until the methods are proven acceptable and then apply them to larger projects.

There has recently been proposed a joint committee of the American Road Builders Association and the American Association of State Highway Officials to study the end product question, principally from the equipment standpoint. There seems to be a good possibility of standardizing equipment as well as making specifications as uniform as design.

Again, specification writers should remember that an incomplete order for a product may get them an expensive something they did not have in mind, whereas, a completely specified order will get them the product they want, whether it is a spool of thread, a road, a bridge or a building—and at a fair price.

**The Cost Control Series by
James P. apRoberts will
continue with Article No.
8 on Methods for Comparative
Analysis in the July,
1961 issue of Roads &
Streets.**

THE NEW JERSEY TURNPIKE AUTHORITY is contracting with Motorola Communications and Electronics, Inc., for five new antenna towers, re-erection and location of an existing tower, and additions to the radio antenna systems throughout the turnpike.

Get more work-output per dollar invested



LW graders offer you these production-boosting advantages

Watch a LeTourneau-Westinghouse grader at work against any machine in its class. You'll see how it always puts out more work at less cost. That's because

LW graders give you more *usable* power for extra blade-thrust . . . more transmission-gear choices for working, maneuvering, traveling at fastest practical rate . . . and unequalled experience in grader research and engineering skill for lowest maintenance. Compare the grader features listed at right . . . then ask your LW Distributor for an on-the-job demonstration.

8 forward speeds, 4 reverse gears, and 3 optional extra-slow creepers on the 5 standard-shift models, 85 to 160 hp. 145 and 190-hp POWER-Flow® models have torque converter, speeds to 26 mph.

Super-strong one-piece frame, for rigid support, trouble-free performance.

Full-floating drive axles and anti-friction power train for more usable power, less wear, less maintenance.

Welded bar-and-plate front axle (strongest in the industry!), arched to give up to 28" ground clearance.

Big blade-circle, 63" diameter for steady blade control.

Full-sweep visibility, operator can see all critical areas of blade, plus road ahead . . . sitting or standing. He also has "handy-reach" power controls.

Easy moldboard tilt adjustment, operator can tilt blade-angle in seconds.

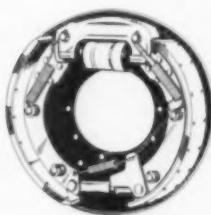
Rubber-mounted engine, to minimize vibration.

POWER-Flow drive on 145 and 190-hp LeTourneau-Westinghouse graders lets you apply full-hp at any speed. Torque converter and constant-mesh transmission provide the effective work-power of infinite gear ratios in 4 speed-ranges, both forward and reverse. This gives you maximum thrust for starting the load...lets you accelerate quickly to blade dirt just as fast as full engine-power can move it.



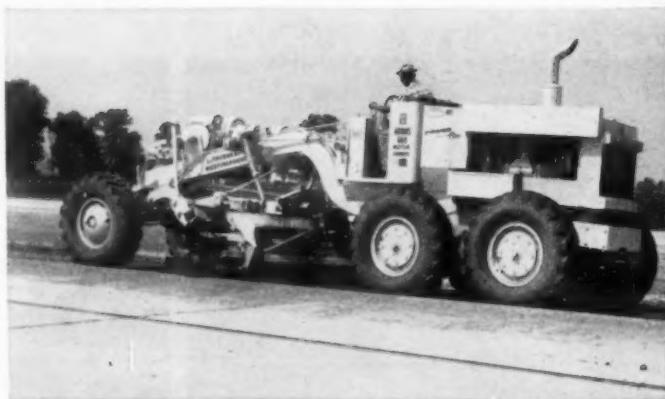
7 LW grader sizes 85 to 190 hp

Preco Dial-A-Slope blade control — one of 7 LW grader attachments — makes it possible to automatically maintain desired cross-slopes while grading. Operator merely sets the Preco "dial" for desired slope — puts either end of the blade under automatic control — and then need only follow his reference line. Result: He gives you a finished grade in up to half the time it usually takes.



NEW!

Self-adjusting brakes now available on LW graders. They're standard equipment on all models. Operating principle is the same as on some 1961 passenger cars and trucks. You simply apply brakes while backing up — and brakes adjust automatically.



G-2417-G-2

LETOURNEAU-WESTINGHOUSE COMPANY, PEORIA, ILLINOIS

A Subsidiary of Westinghouse Air Brake Company

Where quality is a habit

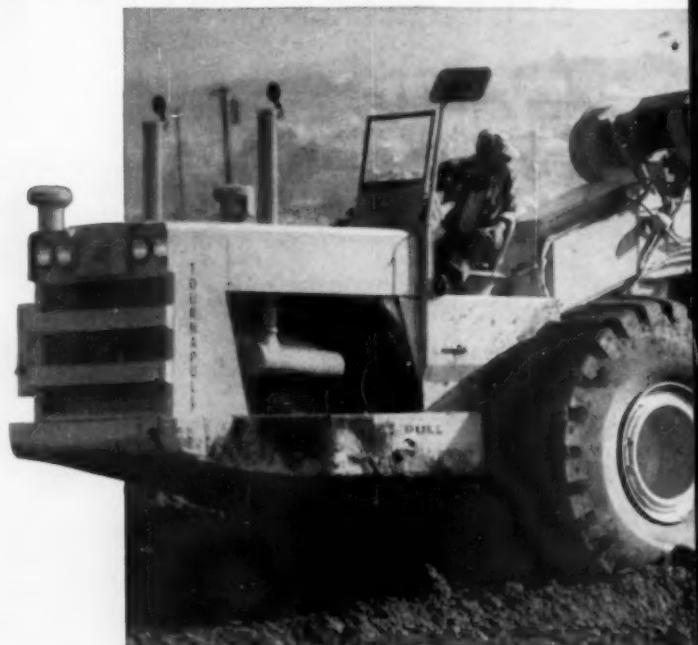
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Move 2 loads per trip

Here's the best way ever developed to cut *earth-moving costs*. Operate *two scrapers* behind a Tournapull® or Speedpull® prime-mover. Net result: You get 100% more capacity than a single scraper at only about $\frac{1}{3}$ extra cost!

Only LeTourneau-Westinghouse offers you a *practical tandem*, in a selection of *practical size-ranges*. Making the "breakthrough" possible is the famed LW electric control system, that sends working power any distance, simply, efficiently. Consider how LW Tandems can put *you* in a more favorable position on the jobs you bid... help you make more profit on the jobs you take.

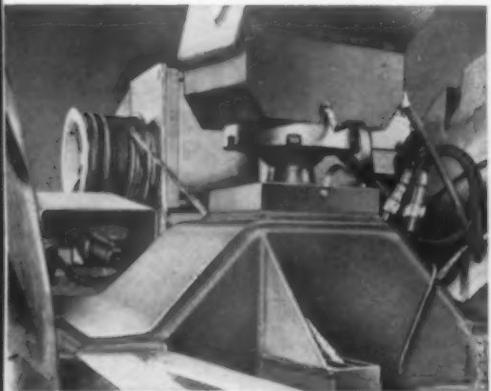


You save three ways with LW Tandem scrapers:

LOWER ORIGINAL INVESTMENT: To double your load capacity you pay only for a second scraper, plus incidental hitch and installation cost. You save the price of the second prime-mover!

REDUCED OPERATING COSTS: Your only extra operating cost for the double-capacity LW Tandem scrapers is for a slight additional amount of fuel per shift. (One operator handles both scrapers.)

LESS MAINTENANCE: Upkeep for a single scraper and for LW Tandems are within pennies-per-hour of each other! There's the nominal maintenance cost of the additional scraper and its two tires, but you have no extra engine, transmission, or any other mechanical component to maintain!



Here's the hitch that doubles your capacity

Front scraper is joined to rear scraper by this ball-and-socket swivel hitch. Hitch base is welded to reinforced push-block frame of front scraper. Rear scraper's electric leads "plug in" to jacks on front scraper.



You get "single-scraper" maneuverability

Although an LW Tandem is considerably longer than a single scraper it needs only 10 to 15% more space for complete U-turn. Rear scraper "tracks" front scraper. You can perform any maneuver possible with single scrapers. No tendency to jackknife.

at only $\frac{1}{3}$ extra cost



You enjoy these **OPERATING** advantages, too:

NO SUPER-PUSHER NEEDED:

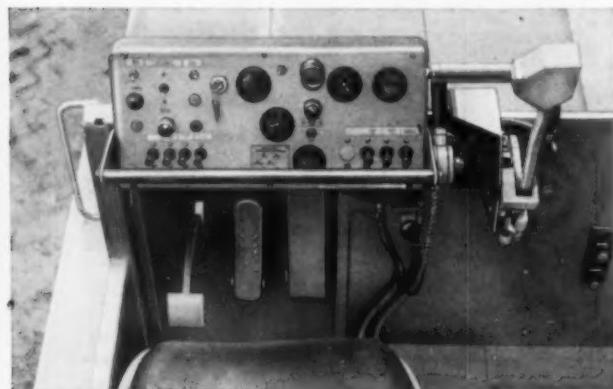
Your pusher loads only one of the tandem scrapers at a time, so you don't need "super" pushers or tandem-pushers. You save pusher positioning time, too.

LESS HAUL-ROAD TRAFFIC:

Tandem scrapers are no higher, no wider, than singles and can use any normal haul-road. You have fewer machines moving about, for less congestion, fewer delays. In addition, tests show that ton-for-ton, tandems punish haul roads less than single scrapers of equal capacity.

MORE ADAPTABILITY:

With LW Tandems you can meet changing job conditions, by hitching or unhitching the "extra" scraper in a matter of minutes. And you can still interchange your basic scraper for a 'Pull' Rear-Dump, as always!



"Electrics" make it possible, practical

These buttons operate bowl lift, apron, and tailgate . . . left row for rear scraper, right row for front scraper. LW "Electrics", with power transmitted to points of action, is the MAIN reason why only LW can give you a *practical* tandem scraper.

Choose from 18 to 58 cu yd capacity

You get extra tandem profits with any LW electric 'Pull prime-mover, 143 to 430 hp. Remember, too, your LeTourneau-Westinghouse Distributor can convert your *present* 'Pulls to tandem operation. He can also give you reliable engineering data that will show you on what job conditions you'll make *most* money with LW Tandems. Visit your LW Distributor soon.

*Trademark TP-2409-DC-2

LETOURNEAU-WESTINGHOUSE COMPANY, PEORIA, ILLINOIS

A Subsidiary of Westinghouse Air Brake Company

Where quality is a habit

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Announcing **3** NEW STOODY



1 STOODY CRUSHERMATIC—A compact, versatile system for automatically rebuilding and hard-facing crusher rolls in position. It enables the welder to work outside the crusher chassis in comfort and clean air. The Crushermatic consists of a motorized carriage riding a track which is suspended over the crusher roll. Wire is supplied to the carriage by any standard semi-automatic wire feeding unit. Uses a 400 amp power supply but 600 amps are preferable. Versatile electronic controls provide proper sequencing for a variety of circumferential and transverse welding patterns. The Crushermatic is portable by one man and is slipped into permanently welded brackets when in use. *It deposits up to 20 lbs. per hour—300% to 400% faster than manual welding and 200% faster than hand-held semi-automatic welding.*

2 STOODY MODEL U W UNIVERSAL AUTOMATIC WELDER—The Model U W provides a complete welding system capable of cylindrical, conical and straight line welding. The 3000 lb. capacity positioner tilts the workpiece through a 120° angle and is equipped with power elevation and thyratron controlled rotation. All electrical controls are unitized in a portable control panel for maximum operator convenience. Ram type manipulator has a vertical travel from 6" to 8-6"; Horizontal travel: 10'; Travel speed range: 5 ipm to approximately 60 ipm. Manipulator mast rotates through 360°. Power source: DC, constant potential selenium rectifier type. Input: 220-440 V, Output: 500 amps at 40 V 100% duty cycle. 5 point slope control.

3 STOODY MODEL T L DUAL-HEAD TRACK LINK WELDER—Provides dual welding heads with wires supplied from twin Payoffpaks for fast, efficient rebuilding and hard-facing. Extremely rugged construction. Features: Special gear-type wire feed rolls; positive high frequency starters; wider, lower bed for easier accessibility and greater capacity; heavy-duty double worm reduction gear box with DC variable speed travel drive motor. Unitized control panel. Bed length: 40'; Bed width: 46"; Bed height: only 24"; Power: 2-500 amp constant voltage 100% duty cycle 220-440 V power sources.

• For full information on all
STOODY AUTOMATIC WELDING SYSTEMS
see your Stoody dealer (check the Yellow Pages
of your phone book) or write direct.

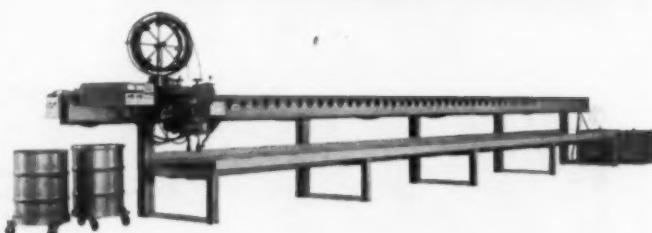
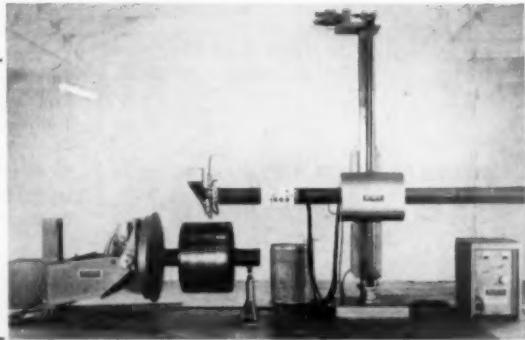
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96

Automatic Welding Systems!

Stoody has long been the recognized leader in alloy wires for automatic hard-facing as well as for hard-facing rods and electrodes. No other manufacturer offers equal experience or a product line so versatile and complete.

Now Stoody augments the best hard-facing materials available to industry with a whole new line of automatic welding machines covering specialized and general needs. Before investing in any automatic welding machines check with Stoody... pioneers and developers in the field of hard-facing, manufacturers of the latest designs in **AUTOMATIC WELDING SYSTEMS!**



STOODY COMPANY
11908 East Slauson Avenue • Whittier, California

ROADS AND STREETS, June, 1961

4th DIMENSION CONCEPT

Continued from page 69

This bridge, designed by the state highway commission, will have $7\frac{3}{4}$ -ft.-long end spans and a $9\frac{1}{2}$ -ft.-long interior span, with steel fabrication being done by Pittsburgh-Des Moines Steel Company. Preliminary tests made by the highway commission on prototype beams indicate that this method of construction is feasible, practical and economical, Gilligan said.

As previously mentioned, he stated, the bending moment varies along the length from high positive moment values in the end spans to high negative moments over the piers to a high positive moment value at the center of the interior span. During fabrication, lengths of the beams subjected to positive bending in service will be prestressed to produce negative bending, and likewise the lengths of the beams subjected to negative bending in service will be prestressed in positive bending.

To produce the prestress, the above lengths of A36 steel wide-flanged beams will be flexed a predetermined amount by the steel fabricator. Then unstressed lengths of USS "T-1" or "T-1" type A steel plates will be tack-welded to the flanges. The lengths receiving the negative moment prestress will receive one plate on the bottom flange of the beam (on compression flange of the beam during prestressing). And lengths receiving the positive moment prestress will receive plates on the top and bottom flanges of the beam. When the flexing load is removed, the lengths of beams will return to approximately their original shape, but will contain locked-in stresses to offset the stresses to be encountered in service.

Continuous fillet welds joining the "T-1" steel plates and the carbon steel beams will be made after the flexing loads are removed. These prestressed lengths will be assembled in the field with either high-strength bolts or rivets. The lengths of prestressed steel beams subject to positive bending in service are designed to act compositely with the reinforced concrete roadway slab. The sizes of beams and plates and the amounts of prestress are calculated so that when the bridge is under design load, the

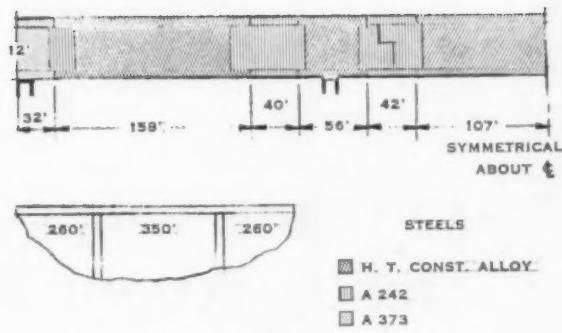


Fig. 3—Whiskey Creek Bridge

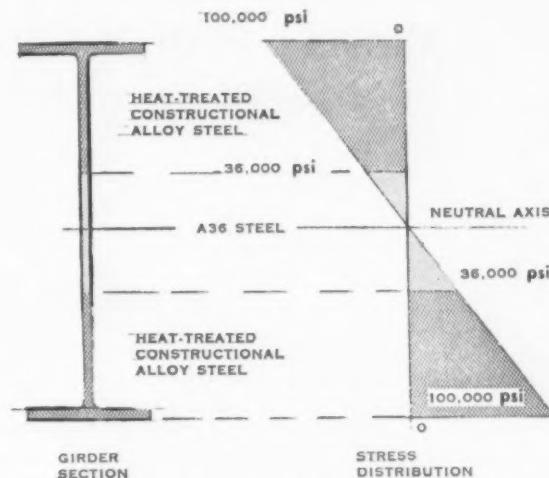


Fig. 4—Deep girder made of different grades of steel

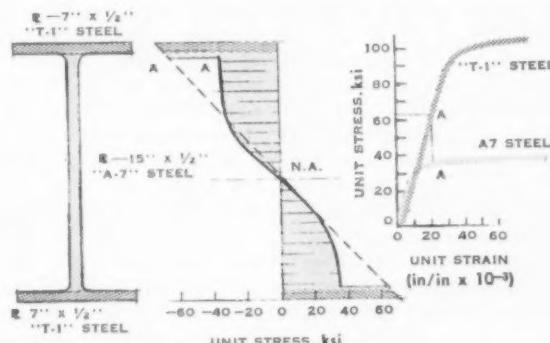


Fig. 5—Test results on hybrid steel beam.

maximum stress in the A36 steel beams is 20,000 psi.

When compared with conventional construction using carbon steel beams, estimates indicate that the use of prestressed steel beams should result in weight savings of about 26 percent in the weight of the beams. Cost estimates indicate

that this weight savings is more than sufficient to offset the added cost of fabricating the prestressed steel beams.

And once again, according to Gilligan, the application of the "fourth dimension" offers interesting possibilities for reducing the weight and cost of steel structures.

Earthmoving— Mostly About Scrapers

Part 4—Analyzing the true costs of scraper operation

By Kenneth F. Park

Consultant

The Tractor-Scraper Again

The cost of scrapers used in production cost analysis, should include the freight. To properly set up the costs of owning and operating, then, the cost in getting it on and off the contractor's job should be added. Its full cost is the basis from which a cost per hour is established.

For purposes of setting an hourly cost for big scrapers, let us take them at \$80,000 each F.O.B. a job.

Depreciation. This is a controversial charge and depends upon the owner's system, or method of setting it up. Several methods, now, allow a rapid charge-off during early ownership and use. The company should pick one method and stick to it. The old straight-line method is easiest to use, and is here set up. Be sure that each machine's hourly cost has this figure in it.

Interest, Insurance, Taxes: Every machine should have to earn this figure whatever it is. Interest is either being paid during the purchase of a machine, or as money invested, if paid for, should be earning interest. The amount generally runs about 5 or 6 percent of the whole value. As to insurance, good business practice should include this item. It will cost about 1 to 1½ percent per year. For taxes, the annual average personal tax on assessed value should run about 2 percent.

The three above items annually total about 10 percent of the *average* investment per year. Letting N equal the number of years, the annual average investment is N plus 1 X total investment, divided by 2N. A quickie for a 2,000-hour work year is .03 cents per hour per \$1,000 of investment. Thus for \$80,000 invested, $.03 \times 80 = \$2.40$ an hour. Otherwise divide the yearly amount by the number of

hours per year the machine is used. These are termed "fixed costs."

Variable Costs

The following costs are termed "variable costs:" Fuel. Generally diesel. A machine burning diesel will use a maximum of about 0.5 per hour per horsepower. It weighs about 7.2 lb. per gal. From these, figure the gallons per hour. This applies only if all horsepower is used all the time. A scraper generally uses .55 of the full possible consumption. In Western U. S. it costs in many areas 1½ cents a gal. At such a cost, multiplying the belt horsepower by .006 will give the cost in dollars per hour. Thus, a 300-hp machine would use \$1.80 worth of fuel per hour. Or the cost can be figured from the factors.

Gasoline. A small item, called Starting, Cleaning — (\$0.03) per hour.

Oil. (lube) Variable. We used to allow a gallon for each 2,000 hp/hours. Then add 2 cents for filters. Multiplying the belt hp by .0008 will give a usable hourly cost. $300 \times .0008 = \$0.240$, based on oil at about \$1.00 per gal. (then add for filters 2 cents). Hydraulic—if such equipment is on the unit—about \$0.015 an hour, or vary as the presence of such equipment dictates.

Grease. About 0.5 lb. per hour, 18 cent grease—\$0.090 per hour.

Labor. Oil and Grease. About a man-hour for each ten hours of use. Thus, at \$4.50 an hour, an hourly charge of \$0.450.

Repairs. Labor. Field work and overhaul or shop work. Around \$1.250 per hr. Parts, vary greatly. Field costs for blades and cable, etc., may be \$3.00 an hour. Shop costs, depending upon the frequency of over-

Continued on page 102



NOT TOO TOUGH FOR A CLEVELAND J

HIGH, DEPENDABLE, DIGGING PRODUCTION in tough rock-digging like this shows how Cleveland J Trenchers pay off. On tough jobs or easy, on jobs of every kind, utilities, pipelines, footings, drainage, etc., Cleveland J's *dig more, dig better*—pay off because of Cleveland features like these:

- Over 30 positive, non-slipping, power-saving digging speeds—the right power-speed combination for every soil and condition.
- Positive, fast, full-range boom hoist.
- 1,000-hour-lubricated, 100% anti-friction-bearing-mounted track with dual drive and support—the world's finest trencher crawler.
- Big 16" x 3" hydraulic steering brakes.
- V conveyor with automatic side-to-side shift.
- Pulley-enclosed, dual, independent, hydraulic conveyor drive with instant control of discharge direction and speeds up to 1,000 FPM.
- Big 330+-cubic-inch engine.
- 100% control of every operation at operator seat with full job-visibility for the operator.

Whatever kind of trenching you do, a Cleveland J will pay off for you... dig more trench, in more places... at less cost. Check them now with your local distributor.



CLEVELAND TRENCHER

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HARD-NOSE UNDER THE HOOD

Chevrolet's Workmaster V8's have know-how aplenty, but knowing when to quit is another story. They've got a stubborn streak a yard wide that keeps them slugging away on the job when lesser engines have given up and gone back to the garage. To put this kind of bullheadedness on a practical, paying basis, only the highest quality design features are good enough, and the Workmasters have 'em all. That's why you'll find them under the hoods of veteran Chevy heavyweights everywhere, under thick layers of grease and grime attesting to thousands and thousands of miles of trouble-free service.

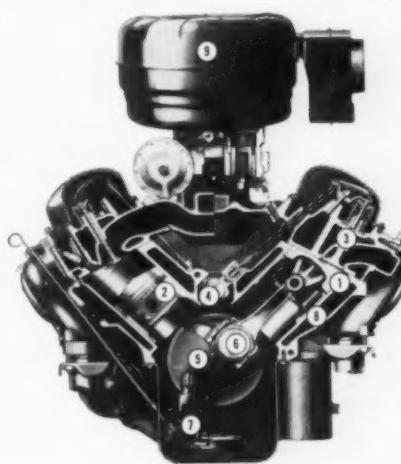
Behind the unique Workmaster brand of performance, durability and economy is a spare-nothing engineering approach which results in a design offering 348 cubic inches of tight-packed, top-level engineering know-how. In either version, the Workmaster or the Workmaster Special, the roster of features offers evidence of truck engineering at its best.

It starts with ultra-uniform, fully machined wedge-type combustion chambers **1** that deliver top smoothness and fuel-stretching efficiency. Aluminum pent-roof pistons **2** are steel-belted at top ring groove, with chrome-faced top and oil rings for long life. Maximum-duty valving **3** includes heat-resistant aluminized inlet and Stellite-faced high-alloy steel exhaust valves, with hardened exhaust valve seat inserts and positive-acting Rotocoils. Valve actuation is by durable roller chain camshaft drive **4** with self-adjusting hydraulic valve lifters. Shock-resistant forged steel crankshaft **5** is induction-hardened at main and crankpin journals for extra-long wear. Premium-quality Moraine 400 main and connecting rod bearings **6** deliver up to seven times conventional bearing life. Full-pressure lubrication system is supplied by positive gear-type pump **7** and includes full-flow oil filter as standard equipment. Pressurized by-pass cooling system features full circumference, full length water jackets **8** to keep temperatures uniform and minimize distortion and wear. And **9** a 2-pint oil bath air cleaner is standard equipment.

These are the features that put Chevrolet Workmaster V8's in the championship class for performance. Why not see your dealer and find out how easy it is to get them working for you! . . . Chevrolet Division of General Motors, Detroit 2, Michigan.

For moving big loads and saving big money,

Chevrolet's Workmaster V8's have know-how aplenty, but knowing when to quit is another story. They've got a stubborn streak a yard wide that keeps them slugging away on the job when lesser engines have given up and gone back to the garage. To put this kind of bullheadedness on a practical, paying basis, only the highest quality design features are good enough, and the Workmasters have 'em all. That's why you'll find them under the hoods of veteran Chevy heavyweights everywhere, under thick layers of grease and grime attesting to thousands and thousands of miles of trouble-free service.



PERFORMANCE DATA	Workmaster Special V8	Workmaster V8
Gross HP @ governed rpm	183 @ 3700	219 @ 3700
Net HP @ governed rpm	160 @ 3700	193 @ 3700
Gross Torque, lb-ft @ rpm	315 @ 2200	335 @ 2800
Net Torque, lb-ft @ rpm	285 @ 1800	302 @ 2600
Displacement, cubic inches	348	348
Carburetor type	2-barrel	4-barrel

MODEL APPLICATIONS

Engine Model	Truck Series	Max. GVW	Max. GCW
Workmaster Special V8	C70, L70, T70	23,000 lb	42,000 lb
Workmaster V8	C80, L80, T80 M70 Tandem	25,000 lb 36,000 lb	51,000 lb 51,000 lb

1961 CHEVROLET STURDI-BILT TRUCKS



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ROADS AND STREETS, June, 1961

EARTHRMOVING—MOSTLY ABOUT SCRAPERS

Continued from page 98

hauls, about \$1.350 an hour. Thus, parts total about \$4.35 an hour. Another figure used by this writer is 90 percent of the depreciation rate per hour.

Tires. Tires are generally available to quantity buyers at discounts. But even at that, on the West Coast, for a big scraper spread the cost is about \$12,000 a set. Drivers offer 2,000 hours of wear and trailers about 2,500 hours before retreading. With progressive companies, daily practicing good maintenance, two retreads can be expected, the repaired tire giving about the same wear as new ones. Normal tire costs should run about \$4.00 an hour.

Operator. Add about 15 percent to union scales, to include any benefits.

Overhead. Add about 10 percent to the total hourly cost.

Supervision. Another 10 percent.

One of the most satisfying means of ending such a series as this is to discuss money. It is the beginning and end of all things pertaining to earth-moving, so fittingly concludes this compilation of data.

There are many kinds of tractor-scrapers today, but only a few such manufacturers have undergone the tests of time to emerge superior. A few are precise workers; use superior metals; are the result of excellent engineers and manufacturing; come through the best distributors, with the best parts, stocks and services. Millions of dollars are spent each year by the leading scraper makers in research and contact with earthmoving contractors and with the world's most complex projects, to build into new products any needed improvement. The most exacting demands of the field are met, without thought of the time or complications involved.

This insures the excavating fraternity the finest products for earthmoving work, without the infliction of self-imposed needs for very exacting and costly experimentation. In the face of such continuing programs, the cost to the consumer has remained unusually stable. Such products can be bought by worthy people at terms that make their ownership possible as well as profitable.

Wheeled, tractor-scaper combinations are the most important such machines today, since they are capable of even short, well-conducted hauls, as well as those out to any distance. As a tool they are most capable of producing great quantities in rapid rates of time, and at unit costs unmatched by any other kind of excavator for a wide range of jobs.

According to size, complications and horsepower, they cost in the range of \$25,000 to \$85,000. Any of the figures, or system of figuring here presented, are usable for accurate analysis, be the machines large or small. In any case, just be sure the figures are complete—and correct!

Beyond this point, the matter of success and/or profits depends on the user's decision on a price for which he will work. The extent of the derived benefits are only possible to the worker who is better informed than his competitor, and makes a more precise performance, plus, if you please, use of better machinery.

A Well Proved Cost of Ownership And Operating Per Hour

Investment. Assumed, scrapers ready for use, at approximately \$85,000 each.

Residual Value. This is a figure presumed to represent the trade-in value after a suitable period of ownership and use, possibly around 7,000 or 8,000 hours of use. At such point it is assumed to have reached a point of obsolescence, or age, or use, at which time it should be completely renewed, or replaced. Following the use of a period typical to such machinery—if properly used in the past and kept maintained—take one-third of its original investment cost—say \$28,300 for a round general figure—a minimum of \$15,000.

This general figure leaves \$56,700 to be depreciated. The total hourly ownership cost is then computed as shown in the table.

Summing Up Hourly Scraper Cost

Fixed Costs

Depreciation (for 10,000 hours)	\$ 5.670 per hour
Int., Ins., Taxes (3¢ per \$1,000)	2.550 "
Total	\$ 8.220 per hour

Variable Costs

Fuel (345 hp 15½¢ per gal.)	\$ 2.070 per hour
Gasoline (starting, cleaning)	0.030 "
Oil, Lube (plus 2¢ for filters)	0.296 "
Hydraulic	0.015 "
Grease	0.090 "
Labor (Oil and Grease)	0.450 "
Repairs (Labor)	1.250 "
(Parts)	4.500 "
Tires	4.000 "
Operator (Union rate plus 15%)	4.500 "
Variable Costs	Total
	\$17.201 per hour
	Total Costs
	\$25.421 per hour

For a more realistic total let us add 10 percent each for Overhead and Supervision. This makes a total then, of \$30.505 per hour. This then, with no profit, is the *minimum* for which the machine should be rented. For bidding, a profit should be added.

The use of such figures as here presented are (or have been, on the West Coast) suitable for most situations. The fact of their near accuracy is due to the use of the machinery in western conditions, and the establishment of the controlling factors of their performance and costs. Without doubt, different parts of the country—even varying local conditions—will change the tenor of the costs.

It is felt to be a highly gratifying situation if the purveyor of the thoughts and figures contained in this paper have prompted readers to look more closely at their own situations. It is not felt that the same conditions would apply everywhere. The important thing is that anyone owning and operating the kind of equipment discussed, has the same kind of problems facing him. In some degree, in some form, the owner of a spread must, of necessity, evaluate *all* of the cost elements because today he must obtain maximum performances. He must know all of the costs involved. Otherwise he must content himself with looking at the debit side of the ledger.

About Used Equipment

It may here be the proper place to mention the values of so-called used equipment. Any machine after short, intensive use is a used machine. Most such machines though, are of such vintage that original owners have disposed of them. There are dealers however, who handle equipment in such manner that it is worked over and presented in a condition that makes it, in essence, like new. After a long period of hard job use most machines need a thorough working over. A big, new, scraper-tractor after 3,000 or 4,000 hours of use needs rejuvenation. By the time it has had 5,000 hours it probably is due for a complete reworking, anyway. At 7,000 or 8,000 hours, maybe a \$15,000 overhaul is not uncommon.* Taken down to its last bolt and screw, sandblasted, all tolerances restored, every worn part replaced, engine worked over and tested—the machine is then as nearly new as possible.

In considering such machines and such practices, the writer has developed a conviction that a good machine to start with—and given proper maintenance—can be kept as good as new, performance-wise, until some radically improved performer shows up. There are areas that need small repairs—even major ones. As repair periods repeat themselves, there develops a time interval for the repair of such areas—the interval indicating the possible need for the repair. The cost of such repairs also become routine. Any area of a machine that is due for work, time-wise, can be kept at top performance indefinitely by keeping the known area repaired when due. It is further a belief that there are indestructible portions of most machines, that can always be built upon again to carry the machine back to its original useful condition. If this is true, then the individual areas that can be fully renewed are those constituting the only need for repairs, and can be kept in that condition with regularity. In its renewed condition the component has all of the performance originally in the new machine. Its hourly cost should be no greater than that for the original machine; less in fact. And its use can be profitably maintained for long periods—generally for less hourly cost. Bought in that guaranteed condition, it is virtually as good as a new machine.

All of these data were obtained in the practice of the Principles herein discussed. The many principles brought out are practical ones, developed by practical people. The practices recommended are ones established as honestly as possible. If they differ greatly from many in good use by others, it is only because of the different conditions attending their use.

The basic thought in any of this kind of palaver is the necessity of knowing the need for concentration on the study and use of any equipment—to bring out its superiority and gain the good potentials expected because of its ownership.

The author hopes he has supplied the incentive for the procurement of better-than-ordinary equipment—for the need of complete understanding of its use. And, he hopes, for the complete success of the professional Earthmover.

*Such overhaul, taking say a week also represents time out of production, conceivably involving a \$3,500 or higher revenue loss, which should be taken into account if the owner has work for his machine. Editor

Job Safety

Smaller Trenching Jobs Too Must Be Safe

Large trenching jobs are almost always planned with measures to eliminate or control hazards. But the comparatively small trenching jobs, which comprise the majority of such operations, are seldom planned for safety.

As a consequence, notes the National Safety Council, deaths and injuries on small jobs are quite numerous. They result from neglect of common safety precautions.

The Council in its "Construction Safety Hints" quotes Herbert R. Westlund, of Argonaut Insurance Co., who suggests that observance of the following safe practices will prevent many injuries:

1. Open only as much ground as needed for good operating results, and backfill as soon as possible.
2. Properly shore or slope all trenches in excess of four feet deep unless in completely stable soil. Otherwise use a trench box.
3. Keep soil at a distance of 18 in. or more from the edge.
4. Keep all unnecessary traffic as far from excavation area as possible.
5. If gas of any type is suspected, make periodic tests with gas detection equipment. Provide for removal or control of the hazard if gas is present.
6. Provide ladders for trench adit and exit.
7. Erect and maintain warning signs, lights, and barricades to protect the public.
8. Instruct employees in safe work methods, and require use of personal protective equipment as indicated by the nature of the work.

Foreman Safety Talks

The National Safety Council has published a new volume of "Five Minute Safety Talks for Foremen." The book—10th in a general industrial safety series—is divided into sections on motivation, machines and tools, materials, movement and managing men.

A collection of 52 safety talks written by Robert L. Moore, superintendent of engineers, Kemper Insurance Co., the book is based on material he gathered in more than 20 years in safety engineering.

Further information and quantity prices are obtainable from the National Safety Council, 425 N. Michigan Ave., Chicago 11, Ill.

New Safety Vest for Road Workers

Development of a new safety vest for use by persons working on or near highways is announced by the Michigan state highway department.

Under Michigan state law, the black and yellow checkerboard vest may be worn only by persons who regulate traffic in a highway construction or maintenance zone.

Seven years of field experience prove it! YOU CAN MAKE



BROKEN ABUTMENTS: Restored stronger than new by brushing on polysulfide-epoxy adhesive to rejoin old concrete, or to bond fresh concrete to old.



FILLING RUTS AND DIPS. Adhesive and aggregate mixed in ratio of 1 to 5 is spread and troweled right over depressed area. No digging down to roadbed or exposing steel reinforcements.

SPALLED JOINTS: Repaired in two hours by using polysulfide-epoxy mixed with aggregate as trowelable compound. Reduces tie-up time as much as 48 hours.



FASTENING TRAFFIC MARKERS. Fixed to road surface with polysulfide epoxy adhesive alone, lane strips have stayed rigidly in place for long periods of time.



LITTLE OF BIG REPAIRS

...with concrete adhesive based on
THIOKOL liquid polysulfide polymer

Two chemicals in combination, THIOKOL liquid polysulfide polymer and epoxy resin, are providing one of the most useful engineering tools of our time.

Together, they produce a brushable, quick-cure adhesive used to join old or fresh concrete to old...to bond skid-proofing materials to roadways...to seal and protect surfaces against chemical attack and water seepage. The resultant bond is stronger than concrete itself, waterproof, acid resistant, and flexible enough to withstand repeated freeze-thaw cycles.

Repairs which heretofore required days of labor and road downtime, the use of heavy equipment and large crews of men are now being completed at a fraction of the cost in time, manpower, material and dollars. Serviceability of such repairs is, by actual experience, proving more satisfactory than those achieved by conventional methods.

Want to know more about this new engineering material? How it's used? Where it's used? The benefits and economies that accrue? Write to Thiokol for brochure CA-200.



POT HOLES: Repaired to featheredge and ready for traffic in as little as three hours when patched with mortar mix of polysulfide-epoxy, sand or aggregate.



HAIRLINE CRACKS: Filled with polysulfide-epoxy. Adhesive film sprayed or brushed over surface seals out water, checks further deterioration.



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ROADS AND STREETS, June, 1961

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CA-200 dealing with concrete adhesives
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Foster Builders Supply ready-mix fleet comprises eight Mack mixers like this unit.

Behind Foster's Macks

are 35 years
of reliability

Take a 1925 truck that still handles its share of the load. Pretty good gauge for measuring dependability, wouldn't you say?

Foster Builders Supply, of Port Huron, Mich., thought so. But they tried other makes to be sure. The results? A fleet of Mack tractors and ready-mix trucks that's as dependable as the 1925 AB Model Mack has been.

Put yourself in Foster's place. Wouldn't you be satisfied with a Mack truck—the

truck that's even more dependable today than it was 35 years ago. Reliability, economy and long life—they're all yours in the initial price of a Mack truck. Mack Trucks, Inc., Plainfield, New Jersey. Mack Trucks of Canada, Ltd., Toronto, Ontario.

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MACK
FIRST NAME FOR
TRUCKS



1925 Mack AB Model still handles its share of the workload.



Modern B Model Mack is geared to present-day demands and loads.



**crush
over-size
rock in
ONE PASS!**



MODEL P-500
225 to 300
TONS PER HOUR

PETTIBONE WOOD PULVERIZER

**for lowest cost
base or
sub-base**

You can save thousands of dollars in road base or sub-base construction costs by crushing native or imported materials right on the roadbed with the new Pettibone Wood P-500 or P-400 Pulverizer.

The Pulverizer's low initial cost, high production and simple, rugged construction guarantee maximum continuous output and profit on your jobs. Write today for complete details.

MODEL P-400
150 to 200
TONS PER HOUR



Pettibone Wood stabilization equipment is used for highway, airport and parking lot construction the world over. Write today for free job studies and your copy of "The A B C's of Soil-Cement Stabilization", an informative, 36 page booklet on stabilization techniques.



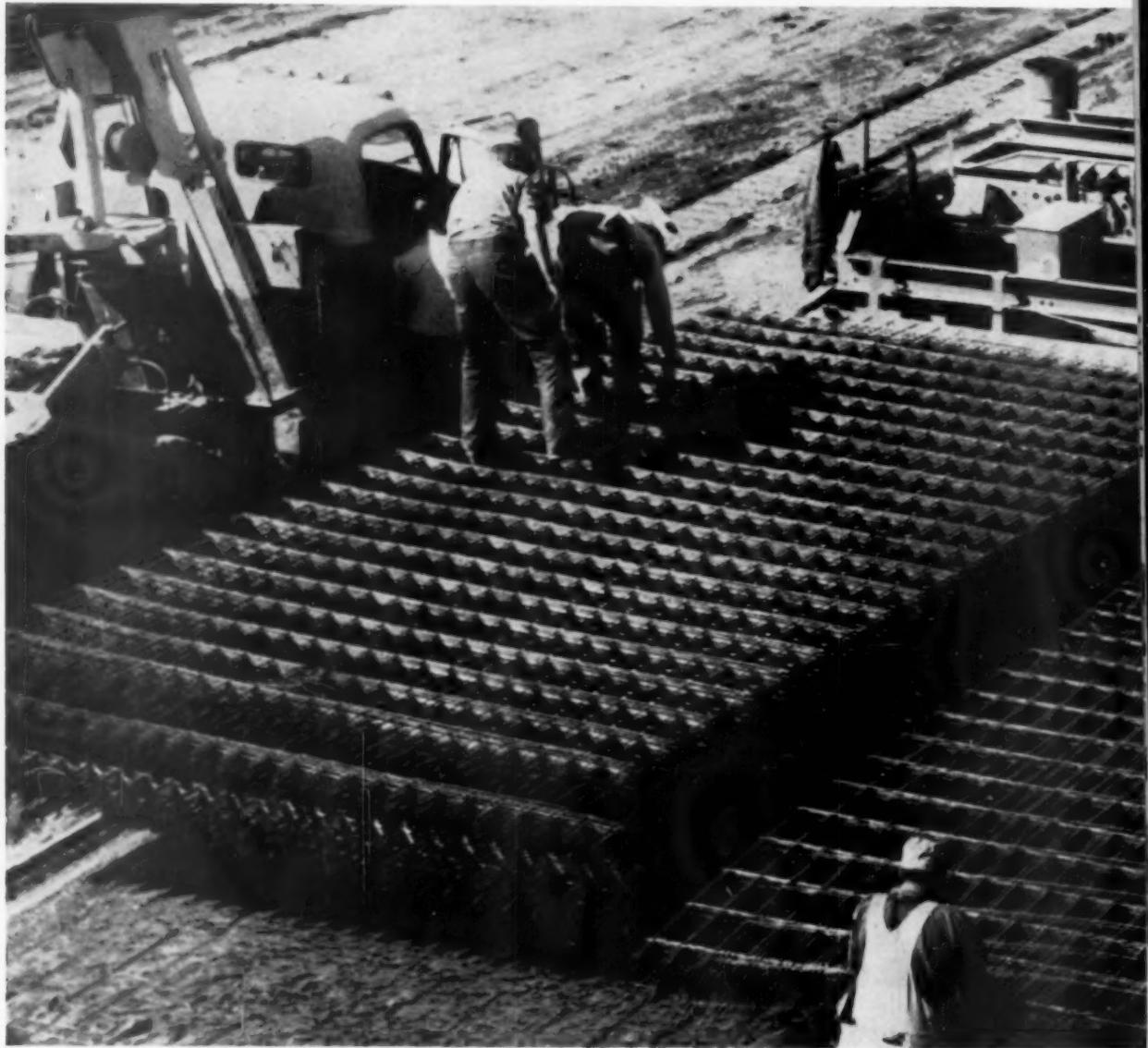
PETTIBONE WOOD MFG. CO.

P. O. BOX 620, NORTH HOLLYWOOD, CALIFORNIA
Originators of mix-in-place roadbuilding equipment

... for more details circle 334 on enclosed return postal card

107

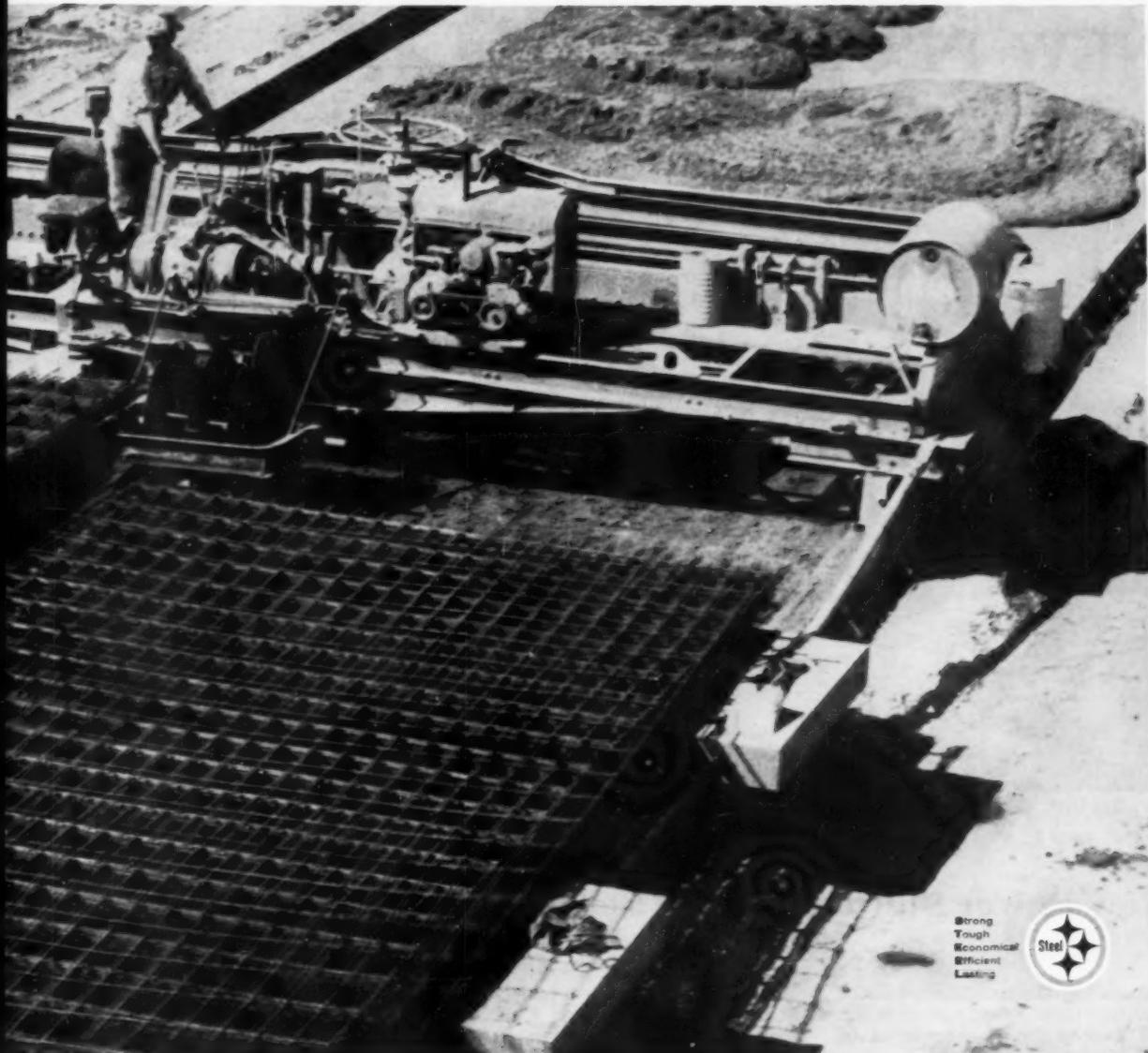




"As sure as Sheffield . . ."

It figures! There are reasons as solid as reinforced concrete to insist on Sheffield Welded Wire Fabric.

You can count on on-schedule shipments. Your schedule to meet **your** job requirements. Sheffield steel mills are strategically located for fast service to the mid-western, western and gulf coast regions. All are at busy transportation centers, so short haul



Strong
Tough
Economical
Efficient
Lasting



deliveries and freight savings are possible in most cases. Production at all plants is geared up to the needs of the fast-moving construction industry.

Service and shipping facilities are geared up, too, for fast service on all orders, regardless of size.

Sheffield Welded Wire Fabric adds 30% to the strength of concrete. For turnpikes, sidewalks,

bridges, any kind of ground, floor or roof slabs—or the smallest driveway or patio job. Available in all standard gauges and spacings. Special gauges can be fabricated readily, with Sheffield reliability and speed. Call or write nearest Sheffield office.
Sheffield Plants: Houston, Kansas City, Tulsa.

SHEFFIELD
ASTM Specification
Welded Wire Fabric



Sheffield Division

... for more details circle 338 on enclosed return postal card

NEW PRODUCTS

Listed here are reviews of new and improved equipment items, selected to aid our readers in purchasing. See reader service numbers on enclosed postcard.*



Caterpillar's New 619C Tractor-Scraper—30 mph. Road Speed With 280 hp.

New Power Shifted Tractor Scraper

Automatically matching power to job conditions, a new power shifted 619 Tractor-Scraper, the Series C, with 280 maximum horsepower has been announced by the Caterpillar Tractor Co. Major features include 18 cu. yd. heaped capacity, and all new design turbocharged engine, 30 mph. road speed, effort saving, air-actuated cable control and unitized construction.

The exclusive torque divider power shift transmission, similar in design to the one used on the 630 and 631 Tractor-Scraper units, provides 9 speeds with only three operator "shifts". As load resistance is overcome, the transmission automatically shifts within each speed range from torque divider drive to direct drive to overdrive. Downshifting also is automatic in each range. To develop maximum rim-pull at pusher matching speeds for

fast loading, the unit can be locked in torque divider drive. A 6 speed direct drive transmission also is available.

Designed for the 619C, the new 4-cylinder diesel engine incorporates "parallel ported" dual exhaust and intake valves, twin overhead camshafts and turbocharged pressure ratio control and aftercooling for maximum fuel combustion efficiency. The engine is rated at 250 flywheel horsepower.

The new air-actuated cable control cuts operator effort, reports Caterpillar. New large tires, 26.5 x 29, 22 ply, encourage higher speed operation over rough terrain because of improved flotation. Axles are full floating and are easily removable for service.

CATERPILLAR TRACTOR CO., PEORIA, ILL.

For more details circle 101 on
Enclosed Return Postal Card.

*To readers outside of the United States—postal rules forbid use of business reply cards outside of the U.S. Please write to us listing the numbers, month and name of magazine, and mail with your name and address to Inquiry Dept., Roads and Streets, 22 W. Maple St., Chicago 10, Ill., U.S.A.

Crawler/Crane Excavator

A new model 25-B, a fully convertible crawler crane-excavator featuring synchronized operating control, has been announced by Bucyrus-Erie Co.

As a crane the new rig is rated up to 50 tons capacity and as a hoe or shovel the machine may be equipped with a 1 or 1½ cu. yd. dipper. It reportedly can handle buckets ranging from 1 to ¼ cu. yd. capacities as a dragline-clamshell. A new air control stand



B-E Model 25

gives the operator synchronized control over the machine's operations. Graduated control valves actuate the main clutches and boom hoist. Cab and control stand were designed to give the operator comfort and operating ease. Valves and gauges are in full operator view. Tread widths are available in 26, 30 and 36 in. sizes. The independent boom hoist provides positive power control of the boom by individual air controlled friction clutches.

BUCYRUS-ERIE CO., SOUTH MILWAUKEE,
WIS.

For more details circle 102 on
Enclosed Return Postal Card.

Large Grouser Bars

Reportedly the world's largest grouser bar, manufactured to fit Caterpillar D 8 series H and D9, Euclid TC 12 and International TD25 or Allis-Chalmers HD 21 has been announced by Allied Steel & Tractor Products.

This new replacement bar, the first designed specifically to fit the giant crawler tractors, is 2½ in. high, 1 in. wide and weighs about 5.3 lb. per ft. Like all Grip-Lug grouasers, the new F-3 is made of special, wear resistant alloy steel and features the patented, exclusive shape that cuts installation time considerably, according to a statement by the company.

ALLIED STEEL & TRACTOR PRODUCTS,
INC., 7835 BROADWAY, CLEVELAND 5, OHIO

For more details circle 103 on
Enclosed Return Postal Card.

Asphalt Plant

A new asphalt plant, the Model L-201, said to feature exclusive flow dryer, hot elevator, 5-ton hot storage bin and air operated gates has been introduced by the White Mfg. Co.

The batching tower has a 1000 lb. mixer. The new plant is rated at 25-30 tons per hr. hot mix. Aggregates



White's Model L-201

can be quickly and easily changed making it possible to run a few loads of base material and switch to top material with a minimum loss of time. Accessories available include asphalt meter, dust collector, aggregate and asphalt scales and asphalt heating systems.

White Mfg. Co., Elkhart, Ind.

For more details circle 104 on Enclosed Return Postal Card.

Re-Styled Motor Scraper

Redesigning and restyling of the TS-160 motor scraper, smallest in the company's line of all-hydraulic machines, was announced by the Allis-Chalmers Mfg. Co.

The revamping was effected to increase the capacity to 8½ struck and



TS-160 A-C's Smallest Motor Scraper

11 cu. yd. heaped and to boost the pay-load to 13 tons. The rig is powered by Allis-Chalmers 155 hp. supercharged diesel engine and maintains an 18.2 hp-to-struck yardage ratio. All-hydraulic operation and double-acting steering jacks and multiplier links give the unit full power steering over the entire steering range. A 90 deg. turn can be negotiated in less than 25 ft., non-stop.

Allis-Chalmers Mfg. Co., Box 512, Milwaukee 1, Wis.

For more details circle 105 on Enclosed Return Postal Card.

Shown here is a Minneapolis-Moline Big Mo 500 tractor with a ¾ yd. front end loader. The big machine, equipped with hydraulic steering and bucket control, is loading sand and salt into a Minnesota highway department truck for snow and ice control. The heated cab was made by Industrial Cab Co. Drive wheel tires are 6-ply 14x24.



Convertible Crane/Excavator

Newest addition to the Unit line of power cranes and excavators is the Model 271-C, a 1-yd. shovel which is



Unit's Model 271-C

easily converted to dragline, trencher, clamshell, liftcane and magnet crane front ends.

Among the many new features is the compact swing circle gear assembly with upper work mounted on a large diameter, double live ring of steel balls running hardened races. The result is a friction-free swing. With the center pin mounting, hook and turntable rollers and roller path eliminated, there's practically no day-to-day lubrication or maintenance required. The swing clutches are able to keep cool because of a unique system which dissipates the heat. Swingers run in a bath of oil which is kept cool by a set of copper coils connected directly to the radiator cooling system. Thermostatic control holds temperature below the point where clutch lining life is normally affected by heat. Automatic traction brakes are provided.

Unit Crane & Shovel Corp., Milwaukee, Wis.

For more details circle 106 on Enclosed Return Postal Card.

Continued on page 114

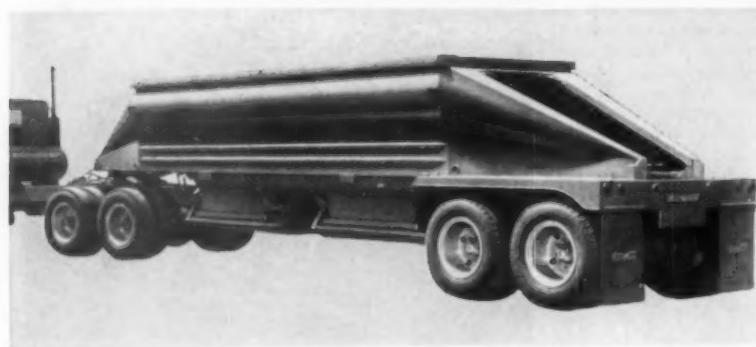
The new Dodge W-400 four-wheel drive Power Wagon is shown here during a test drive where vehicles are subjected to climbs up 44 percent grades with a maximum load. The V-8 engine has a 200 hp. engine with 318 cu. in. displacement.



Dodge, 7900 Joseph Campau, Detroit 31, Mich.

For more details circle 107 on Enclosed Return Postal Card.

Report from Booming Texas...



Legal Payloads Increased to 24 Tons in Texas with Gar Wood Hoppers

Texas contractors can now legally haul 24 tons of payload by using a 20-cubic-yard Gar Wood semitrailer with a tandem axle tractor.

This payload increase is possible because Gar Wood has eliminated the dead weight of conventional truss-frame construction. Gar Wood's exclusive Mono-Shell hopper design greatly

reduces tare weight, and Gar Wood's mounting techniques distribute more load over a much greater axle span.

Gar Wood hopper trailers are available in a wide range of open and enclosed models for train and semitrailer operation, with a choice of seven types of discharge gates for every hauling need.

FORT BEND DRAINAGE DISTRICT PICKS GAR WOOD DUMPS

Thirty miles southwest of Houston, the Fort Bend County Drainage District is



using three Gar Wood dump bodies.

Gar Wood is the world's first and largest producer of dump truck equipment. Job-proven on thousands of trucks, handling every type of material, Gar Wood dump bodies usually outlast the truck itself. And the Gar Wood line of medium and heavy-duty hydraulic hoists allows a truck to be specifically designed for specific hauling requirements.

Gar Wood truck equipment is more than just "ruggedly built." It is designed with scientific precision for light weight and the utmost resistance to stress and strain.

DALLAS GOES GAR WOOD FOR MUNICIPAL DITCHING

The city of Dallas uses four ditchers to handle noncontracted work within the city limits. All four are Gar Wood-Buckeyes.

These machines are operated primarily by the Dallas Water Construction Department to ditch for new water lines. A Buckeye 308 is employed when the digging is through hard limestone rock. A Buckeye 407 is used primarily



in dirt. Two Buckeye 160's (see photo) are used for all-purpose ditching in all types of soil.

GAR WOOD WINCH SERVES AUSTIN COUNTY DRAINAGE DISTRICT

A Gar Wood 30,000-lb. winch, mounted on a self-locking oil field truck body, is being used to pull trees, load low boys, and for many tasks in bridge construction in the Austin County Precinct 3 Drainage District. Gar Wood is the world's largest manufacturer of both stationary and truck-mounted winches.



Buckeye 403 called "Best in close quarters"

"The Gar Wood-Buckeye 403 is the best machine made for close-quarter ditching," says Jack Kennemer, owner of the People's Trenching Service of Garland. Kennemer owns two 403's plus a Buckeye 308. His work is primarily in Central and North Central Texas, in terrain varying from caliche to gumbo.

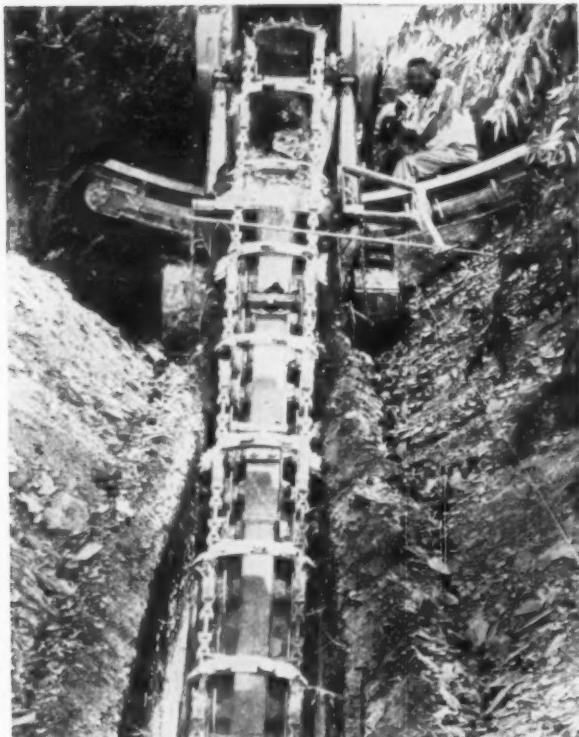
"In tight work the 403 always gives us the proper depth of cut," he says. "It is compact, easily transported, and its operating cost is extremely low. It's a darn good little machine—the ideal machine for fast, accurate ditching in close quarters."

Houston Buys Load-Packer after Comparison Tests

Refuse collection in Houston is performed by a fleet of 29 Gar Wood Load-Packers. Many of the units are new—purchased after comparison tests of packer bodies by an independent Texas research lab. More Gar Wood refuse collection bodies are in service today than all other makes combined.

GAR WOOD'S AT WORK!

Dallas Contractor Rips Through Rock with Seven Buckeye Ditchers



GAR WOOD - BUCKEYE 407, owned by Ray F. Smith & Son, Dallas general contractor, cuts a straight, clean ditch through rocky Texas terrain. This ditcher is one of seven Buckeyes owned by the contractor.

Fort Worth Contractor Calls Buckeyes "FINEST MACHINES I'VE EVER USED!"

"For ditching through this Texas chalk-rock, there's no question about it—Buckeyes are the best machines I've ever used."

This statement by John Ratliff, General Manager of the Glade Construction Company of Fort Worth, is typical of the high praise, contractors across the country have for Gar Wood-Buckeye ditchers.

Ratliff is currently using two Buckeyes, a 315 and a 307, for general construction ditching in the Fort Worth and Austin areas. He has been using Buckeyes continually for more than 18 years.

... for more details circle 305 on enclosed return postal card

ROADS AND STREETS, June, 1961

Around the areas of Dallas and North Central Texas the terrain is rocky, much of it hard limestone. To ditch profitably through this ground you need a ditcher with both rugged construction and plenty of digging power.

Dallas contractor, Ray F. Smith owns seven such machines—all of them Gar Wood-Buckeyes. "Two-thirds of our work is in rocky terrain," says Smith, "and Gar Wood-Buckeyes make the *best* machines for our kind of work. Each one is designed for fast, profitable operation."

Smith's machines are getting a real workout (the Dallas area is growing fast) but maintenance costs for his seven Buckeyes have been extremely low—one important reason why Smith has gone exclusively Gar Wood-Buckeye.

There are other reasons. Every major engineering development in ditching for the past 68 years has been found first on Buckeye ditchers. Today, Gar Wood continues to set the standards in the field. From mammoth pipeliners to small utility machines, Gar Wood-Buckeye ditchers are setting records for high production, low maintenance, and long, trouble-free operation.

More and more contractors, like Ray Smith, are realizing that whatever the job, no other ditching machine can match a Buckeye for performance, production, and profit.



Ratliff's satisfaction with Buckeye ditchers is the result of Gar Wood's constant engineering efforts to help contractors make a substantial profit—by giving them far more ditching production at far less cost.

GAR WOOD INDUSTRIES, INC.

Wayne, Michigan • Findlay, Ohio



Side-Dump Truck Body

A new Dumpcrete side-dump truck body designed and built by Maxon Construction Co., Inc. is reported to offer many new advantages in highway and airport construction.

Electric cab controls permit driver controlled fast discharge of a 12 ton (6 cu. yd.) load in 45 seconds from truck-stop to truck-go, with no dumpman or spotter required.



Maxon's 12 Ton 6 Cu. Yd. Body

The Dumpcrete side-dump mounts on a standard truck chassis, requires no outriggers and drives parallel to the forms with no backing or angling of the truck. Special trailer mounted units permit one driver, one truck to deliver up to 12 cu. yd. The new bodies are designed to work with the Dumpcrete concrete spreader as part of the complete "Dumpcrete Method".

Dumpcrete side-dump advances include mass discharge of concrete with no segregation, clean discharge of lowest slump concrete and the ability to haul sand, gravel, base coarse materials and excavations. The low height and wide top permit loading under the central mix plant.

Maxon Construction Co., Inc., 2600 Far Hills Ave., Dayton 19, Ohio

For more details circle 108 on Enclosed Return Postal Card.

Continued
from page 111

mover wheels work on the compacted areas, reducing drawbar power requirements. Dynamic impacts up to 25,000 lb. within a range of 600 to 1,400 impacts per minute are directly vincible.



VR-84 Vibratory Impactor

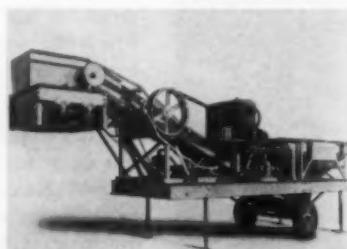
only and reach deep down to consolidate the particles of material, quickly forming a unified mass.

Seaman Corp., Seaman-Gunnison Div., Milwaukee, Wis.

For more details circle 110 on Enclosed Return Postal Card.

New Dragline-Clamshell

A model 210-B diesel-electric dragline and clamshell has been added to the Bucyrus-Erie line of heavy-duty crawler excavators. The Milwaukee firm reports the machine, with boom



Iowa's Stabilized Base Mix Model

newly engineered to give high hourly production and handle a wide range of base course specifications. The Model 1 series are compact, highly portable units with either single shaft or twin shaft pugmills. All have 6½ cu. yd. bins with a long side dimension for ease of loading with a front-end loader. A 4½ cu. yd. bin extension is optional as in an extension with a 2 in. grizzly for rejecting oversize material. All models have provisions for adding calcium chloride or soil cement feeders and an asphalt emulsion attachment. These units are also available as portable units to which pugmills can be added as needed.

Iowa Mfg. Co., Cedar Rapids, Iowa.

For more details circle 109 on Enclosed Return Postal Card.

Vibratory Impactor

The model VR-84 self-propelled vibratory impactor introduced by the Seaman Corp. is said to compact heavy clays as well as a wide range of other soils and granular materials.

The machine is comprised of a two-wheel modified prime mover with the front carried on a steel roll with spring-mounted vibratory element. The prime



B-E Model 210-B 10 Cu. Yd.

lengths of 100 to 140 ft., can handle buckets up to 10 cu. yd.

Designed for high production and low maintenance, a key feature of the 210-B is the elimination of friction clutches for all cyclic functions. Hoists and drag or holding and closing motions are regulated by a static type control of independent electric eddy current clutches, which are liquid cooled by a radiator system. The swing motion is controlled by a variable Ward Leonard system. An elevated cab gives the operator an unobstructed view.

Bucyrus-Erie Co., South Milwaukee, Wis.

For more details circle 111 on Enclosed Return Postal Card.

Pillar-Mounted Crane

A new full-revolving, pillar-mounted crane, which features simplicity of design and minimum space requirements, has been introduced by R. G. LeTourneau, Inc. The 1000 lb. capacity all-electric unit has a total weight of 60,000 lb.

Designated the RD-120, the new crane is the latest addition to LeTourneau's line of cranes designed for construction, materials handling and off-



LeTourneau's RD-120

shore oil work. The low space requirements of the RD-120 crane is the result of single column mounting and short tail swing design. The drive system is all electric. Each crane function is direct driven by its own individual high-torque Gearmotor. This eliminates transmissions, clutches and long power transfer systems. Power is normally supplied through a 275 hp. diesel engine, but where it is practical power can be supplied from commercial power other than the existing power source.

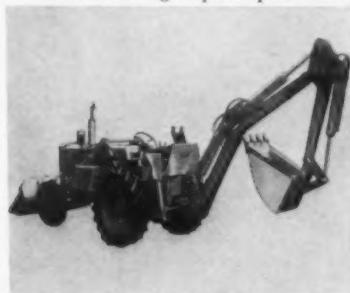
R. G. LeTourneau, Inc., 2399 S. Mac Arthur, Longview, Texas

For more details circle 112 on Enclosed Return Postal Card.

New Loader & Trencher

New matched equipment for the Oliver 770 Industrial tractor has been made available by the Ware Machine Works.

The Ware 778 Industrial Loader is a full-framed, high speed production



Ware Tractor Equipment

loader featuring a $\frac{1}{4}$ cu. yd. rated capacity and 66 in. width bucket. Other features of the machine are a 40 deg. bucket breakout and an 800 lb. breakout capacity; automatic bucket leveling

and a rated lift of 5100 lb. to full height.

Also announced is the Ware Model 450 Hydro-Trencher, which is said to be specifically matched for operation in combination with the 778 Industrial Loader. This model features a quick-detach system, a digging reach of 20 ft. 7 in. and a bucket breakout capacity of 10,100 lb. Both models use tensile steel box section type construction.

Ware Machine Works, Inc., Ware, Mass.

For more details circle 113 on Enclosed Return Postal Card.

Lightweight Crane Booms

A new, lightweight boom for the Bay City 40-ton model 610-T8440 CraneMobile has recently been unveiled by Bay City Shovel, Inc.

The boom carries 150 ft. of main boom and a 50 ft. jib for a total of 200 ft. each. The basic boom is 40 ft. long, pin-connected and has 10, 20 or 30 ft. center sections with corresponding length pendants and swaged sockets. Three ball-bearing mounted sheaves make up the boom point.



Bay City Booms

Made of T-1 seamless tubular steel, the basic boom has a box section of 48 by 48 in. The jib is 30 ft. long with 10 ft. center section and a single ball-bearing mounted sheave at the point. Also of T-1 steel, the jib has a box section of 20 by 20 in. In combination, the 150 ft. boom and the 50 ft. jib provide a capacity of 6,000 lb. With the boom alone, it has a capacity of 27,850 lb. at a 35 ft. radius, reports the manufacturer.

Bay City Shovel, Inc., Bay City, Mich.

For more details circle 114 on Enclosed Return Postal Card.

Visual Signal Safety Panels

Self-sticking, diagonally striped panels that give visual signal of safety hazards or mark the locations of protec-

tive safety equipment are now being manufactured by the W. H. Brady Co. of Milwaukee.

The panels are made of tough .005 in. vinyl plastic. Stock colors are yellow and black, conforming to ASA and NSC color codes for caution and alert



Brady's Self-Sticking Panel

warning. The black and yellow striping is imbedded in the plastic . . . sealed-in colors that are reported not to fade. Panels stick to any clean dry surface without moistening, chemical activators or tools. No drying time is required. By peeling off the protective backing, it can be applied to metal, wood, plastic, masonry or painted surfaces.

W. H. Brady Co., Dept. 143R, 727 W. Glendale Ave., Milwaukee 9, Wis.

For more details circle 115 on Enclosed Return Postal Card.

New Backhoe Line

A newly-designed line of backhoes has been introduced by the Windsor Pippin Corp.

Designated the 260-H and 360-H, the backhoes are for use with light or medium tractors and medium or heavy



Pippin Backhoe

tractors, respectively. The re-designed Pippin backhoe line now features a chrome-nickel molybdenum boom bracket for added strength, improved hydraulic cylinders for increased digging power and hardened bosses where boom bracket attaches to the main frame. The company reports that the Pippin line is adaptable to any make or model tractor, American or foreign.

Windsor Pippin Corp., Windsor, Vermont

For more details circle 116 on Enclosed Return Postal Card.

Continued on page 138



Steel reinforced

for longer life in storm sewer service!

Concrete pipe reinforced with strong USS AMERICAN Welded Wire Fabric solves drainage problems.

Albuquerque, like most southwestern cities, is spreading out. You see new construction almost everywhere you look. This photograph shows some of the activity that goes into transforming the wide open countryside into new residential areas. It was taken in the North East Heights development and shows the laying of reinforced concrete pipe for a storm sewer. In this project, approx. 17,000 lineal feet of reinforced concrete storm sewer pipe from 24" dia. through 72" dia. was laid.

The pipe shown is 72" pipe, and every foot of it was steel-reinforced with USS AMERICAN Welded Wire Fabric to give it the strength and durability to withstand heavy loads and assure long service life. It was pre-tested to meet the rigid requirements of ASTM Specifications C76-57T, and will withstand loads exceeding 100,000 lbs.

A large number of concrete pipe manufacturers are using USS AMERICAN Welded Wire Fabric to get greater strength and durability. This quality wire fabric is made on precision machines to the closest of tolerances $\pm 0.003"$ —with center to center spacings held to $\frac{1}{4}"$. It is prefabricated from cold-drawn, 60,000 psi min. yield strength wire. All intersections are electrically welded to assure positive mechanical anchorage in the concrete. For more information about USS AMERICAN Welded Wire Fabric—write American Steel and Wire, Dept. 1167, 614 Superior Avenue, N.W., Cleveland 13, Ohio.

USS and American are registered trademarks

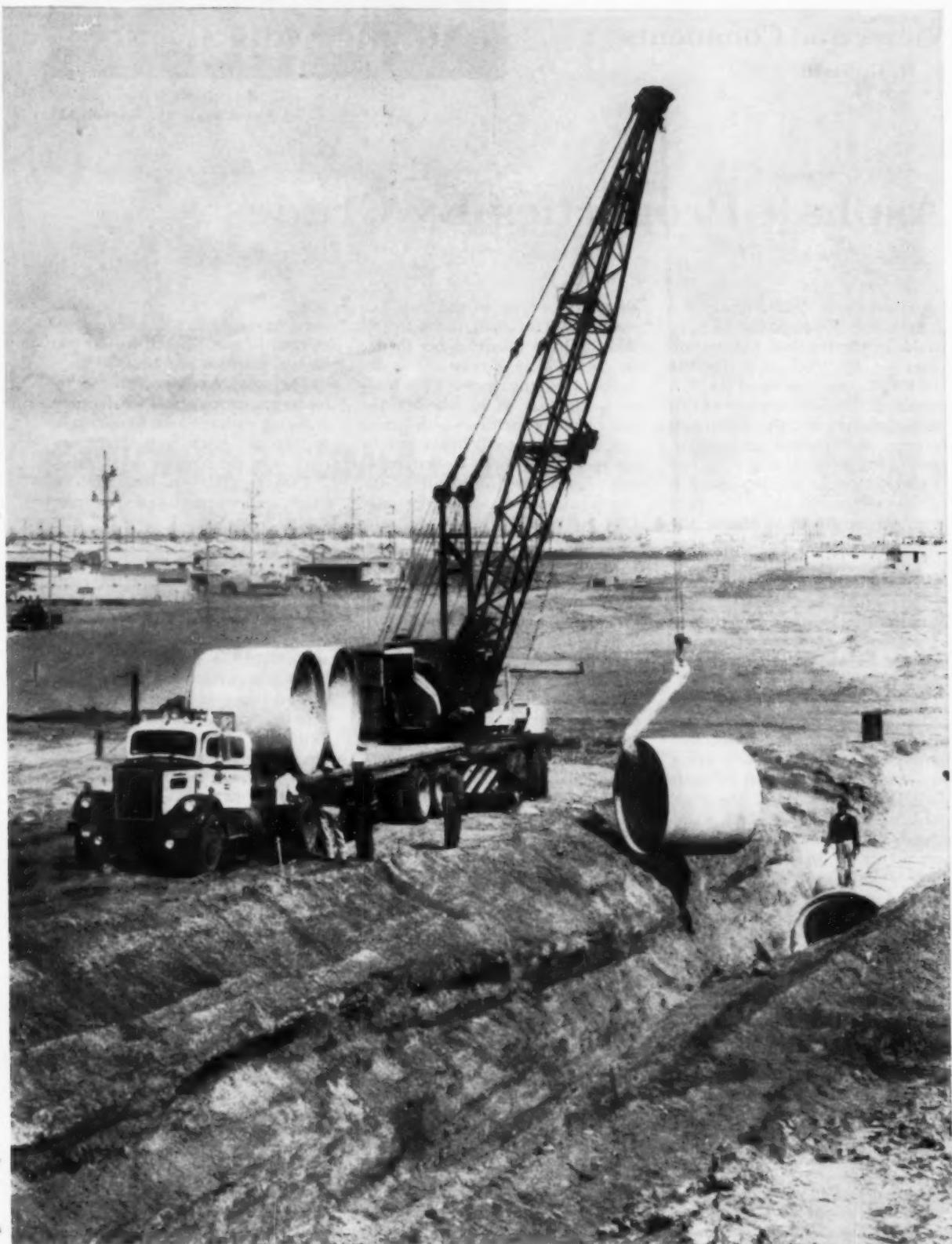


**American Steel and Wire
Division of
United States Steel**

Columbia-Geneva Steel Division, San Francisco, Pacific Coast Distributors
Tennessee Coal & Iron Division, Fairfield, Alabama, Southern Distributors
United States Steel Export Company, Distributors Abroad



Project: Storm Sewers, North East Heights, City of Albuquerque, N.M.
Engineers: Gordon Herkenhoff & Associates. **Contractor:** C. R. Davis Contracting Company. **Product:** Reinforced Concrete Pipe ranging in size



from 24" to 72" dia. Reinforced with USS American Welded Wire Fabric.
Manufacturer: Pipe by American-Marietta Corporation. Reinforcement by
American Steel and Wire Division of United States Steel.

... for more details circle 344 on enclosed return postal card

ROADS AND STREETS, June, 1961

This mark tells you a product
is made of modern, dependable Steel.



Asphalt Properties By Grades

About a year ago the results of a study of commercial U. S. asphalts in the nominal penetration range of 85-100, made by the U.S.B.P.R., was reviewed in this magazine. The second phase of this study, bringing out the differences between the various penetration grades, has been discussed in last October's "Public Roads", and will be the subject of brief comment here. As might be expected, the trend of properties, as the penetration of the asphalt varies, provides valuable information to the specification writers, but leads to fewer conclusions (other than those known for many years) of interest to those having only general concern with asphalt properties.

The number of asphalts tested in each grade was not as great as those checked in the initial study, but is quite sufficient to clearly bring out trends. The asphalts of both studies were obtained at the same time, and therefore permit valid comparisons. However, as the report points out, these trends should in certain cases only be studied with asphalts from one source and presumably of the same manufacture.

The specific gravity, soft point, viscosity at 275 F and flash decreased with increase in penetration, while the loss in weight in the thin film oven test increased (with a corresponding increase in the percent loss in penetration of the loss residue). These are trends to be expected for specific source materials from the well known properties of asphalt. But it is perhaps surprising that the most likely value of the specific gravity for the various asphalts, as brought out in the distribution polygrams described in the first report, does not change much with the grade. A similar comment can be made for the maximum ductility, flash point and

change in weight in the thin film oven test. Obviously the source of these asphalts (due to either change in crude or in processing) is influenced by the grade. This leads to speculation as to whether the functional properties which generally are not directly measured by the specification tests—cohesiveness, low temperature (or road) oxidation resistance are examples—may tend to vary markedly with the grade selected.

Temperature effect trends are interesting. The penetration ratio distribution is closely the same, although showing some tendency to increase for the harder grades; and the 39.2 ductility at 1 cm. per minute shows a parallel trend for the 60-70 and 85-100 grades but a quite different one for the 120-150 material. Evidently the complexities in the interpretation of the conventional ductility test are still here.

The report repeats the comment that a surprising, even though not large, number of samples fail to pass the usual specification tests, but that in the case of penetration a large proportion were in the reproducibility range for this test. Evidently if the requirements set for some of the tests need the accuracy of control indicated by present specification limits, more precision in testing would be highly desirable.

Another repeated comment is that the so-called quality requirements now demanded in many western states are not being met elsewhere, although there is no parallel evidence that the pavement quality obtained is inferior.

The considerable variation in viscosity with both source and grade is pointed out, with the conclusion that proper attention to mixing temperatures is obviously essential.

Much data in the report, particu-

larly with regard to the thin film oven test requirements, are of great interest to specification writers but do not justify space here.

The need for more precise information concerning asphalt quality, along with research to obtain it, is correctly given considerable attention in the report.

Two general but basic conclusions seem demanded by these studies.

The first is that most of the asphalts produced in the U. S. meet any of the widely used specifications regardless of those under which they were supplied. This does not mean that all these asphalts are about equal in quality, or that the specifications really measure quality beyond the point necessary to eliminate clearly inferior materials. Rather it means that present-day specifications tend to reflect field results to the extent these have been correlated with asphalt quality.

The second is that, since they fail to be met by a considerable number of asphalts of good quality by the above criterion in other areas, the recent specification changes intended to improve quality have not always done so. They have done so (if such is really the case) by a coincidental relationship between their demands and the requirements for improved quality in their particular crude source or processing; they clearly do not fully provide a direct criterion of quality that has universal application.

This brings us back to the same old conclusion: we need more direct measures of the functional requirements of asphalt in any specific intended use, with perhaps the corollary that we need clearer concepts of just how the asphalt functions and where; and when and how it tends to lose such quality as it may initially have.



Seal Coating with Cationic Bitumuls produced uniformly fine results in spite of early showers

CATIONIC BITUMULS SPEEDS SEAL COATING IN TACOMA

The City of Tacoma, Washington, has two major sources of street maintenance problems. First, some forty miles of very old (1890-1915) sheet asphalt surfaces. These are now badly cracked and extensively patched. Second, several hundred miles of streets that have only a light bituminous treatment. The ever-increasing traffic load is starting to cause trouble on these.

In the past, the City has settled for continuous patching on the sheet asphalt; and Seal Coating of the light bituminous arterials, using either anionic emulsions or cutbacks. The Seal Coating required closing the streets to traffic for long periods; and weather was a constant threat, restricting the work seasonally.

City maintenance forces were quick to see two major advantages of Cationic Bitumuls when it was first introduced. A—This material

had a natural affinity for the cover aggregate being used. B—The rapid-setting characteristics sharply reduced the danger of "wash-off" from rain. (When showers actually occurred within two hours of job completion, there was no damage!)

Based on earlier work the City was able to "field" a well-integrated Seal Coating team. Cationic Bitumuls sets rapidly so that Seal Coating operations were co-ordinated even more closely. Both the cover-stone truck and the pneumatic roller could follow very closely behind the distributor!

The Seal Coating operation has now been extended to the "ancient" sheet asphalt pave-

ments. Here it prevents the break-up action that made earlier patching necessary.

Using Cationic Bitumuls, streets are closed to traffic a much shorter time; and the work season begins much earlier in the year.

Discover for yourself the ability of Cationic Bitumuls to extend the work season; and to coat and hold most aggregates—even those normally regarded as "difficult". Bitumuls Engineers in our nearest office will supply full information; and will arrange for you to see a Cationic Bitumuls job in your area.



Close-up view of a Cationic Bitumuls Seal Coat. Note uniform cover-stone retention



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BY KEN DASKEY

About the Author. Ken Daskey is well qualified to provide valuable assistance to his customers. He has been with the Company for 14 years, and spent 10 years in Commercial sales. In addition, he has received specialized schooling in an asphalt training course at his Company's Whiting, Indiana, refinery.

* * *

Asphaltic Concrete Corporation paved a two-mile stretch of one of the most heavily traveled streets in St. Louis using 7 P.M. to 3 A.M. shifts. The route carries U.S. 66, 50 and Missouri 30, in addition to a tremendous load of city traffic southwest through the city. The specification hot mix was laid on the 80-ft. wide street in 12 ft. strips so that the street was always open to traffic. Putting down 1,350 tons of Asphalt established a new all time eight hour shift record for the city of St. Louis.

We played a part in the job by always having Asphalt available for delivery to A.C.C.'s

batching plant on time. Deliveries were from American's Wood River refinery, less than fifteen miles from the job. Being sure of deliveries, A.C.C. could plan work and know it could keep to the schedule.

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Night shift and the American Oil man is there. American Oil's Ken Daskey discusses application of Asphalt with Pete Pellin, job superintendent for Asphaltic Concrete Corporation. Night shift idea won editorial praise from a St. Louis newspaper.



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American Oil helps contractor put down 1,350 tons of Asphalt in 8-hour shift

COMPACTION CLINIC

Boosts daily dirt in place from 11,000 to 16,000 cu yd with same scrapers and tractors

Contractor switches to thin lifts and Duo-Paction

On a half-million cu yd of fill for a huge shopping center, the contractor* started the job by moving dirt into the fill area in eight-inch lifts—filling in one area while another was sheepfooted with five crawler tractors. Use of this project-type compaction method limited production to 11,000 cu yd per day.

The contractor then switched to the progressive method of dumping, dozing and blading, followed by Duo-Paction with three Duo-Pactors. Three passes provided the required high density and readied the fill for the next lift.

Rolling at speeds up to 7 mph, the Duo-Pactors worked in cycle with the scrapers. Unloading in thin lifts on the run also aided material pulverization, minimizing dozer and grader requirements.

Results were so satisfactory that with no increase in the scraper fleet, productivity increased from 11,000 to 16,000 cu yd per day.

Work was done in the midst of the rainy season. At day's end, or ahead of thundershowers, the Duo-Pactor's steel roll was lowered,

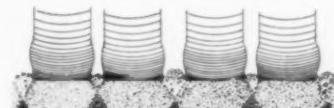


Sand fill in 3 in. lifts, spread and compacted in one pass at more than 10 mph.

to smooth and seal the fill surface. Runoff was so complete that work could be resumed almost immediately, even after a heavy rain.

More Uniform Densities with Duo-Paction

With either deep or thin lifts, material displacement is the arch-enemy of uniform, low-cost compaction. Displacement takes place when wheel loadings exceed the bearing



Closely-spaced tires minimize displacement and promote material confinement.

value of the material. *The wider the tire spacing, the greater the displacement.*

Duo-Pactors provide a narrow spacing between tires, thus confining the materials to full rolling width but still having individual tire movement and controlled oscillation in pairs.

This is one reason why the Duo-Pactor has conclusively proved its ability to obtain uniform, high density compaction not only on fills and embankments, but also on sub-base or base materials and stabilized surfaces, *at immense savings in man and machine hours*. Uniform density is further assured by lowering the steel roll, forcing ridged material down between the compacted tire tracks, further preventing displacement.

From coast to coast, Seaman DUO-PACTORS have job-proved their ability to meet the most rigid density specs, while saving up to 75% in man-hours, and up to 50% in equipment cost, on all types of compaction, from fill to finish.

There's a Seaman Duo-Pactor, Tri-Pactor, or Vibratory Impactor to match your exact job requirements—Write today for specification sheets!

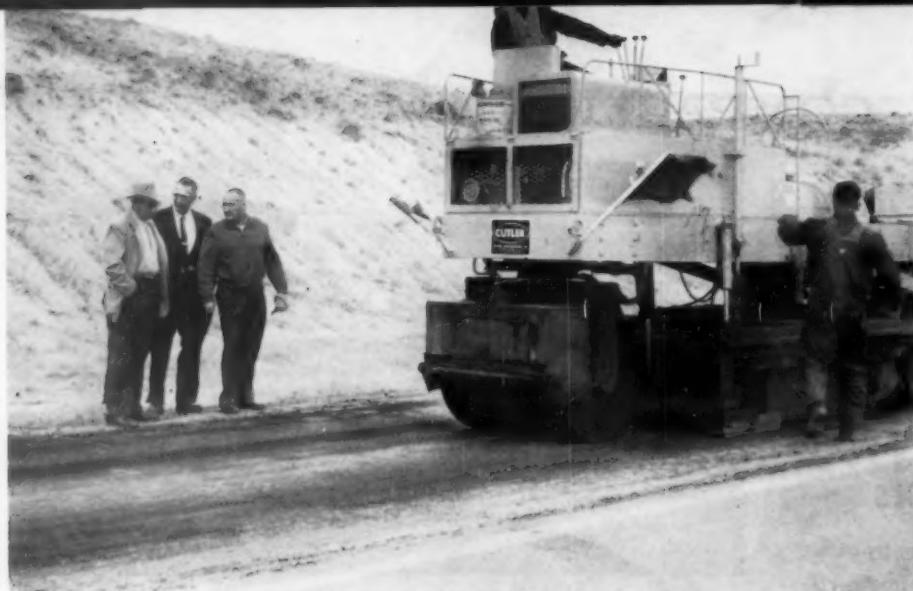
*A certified contractor report from Seaman Corporation files

Please send me Specification Sheets as checked below:



- | | |
|--|--|
| <input type="checkbox"/> 7-20-ton Duo-Pactor | <input type="checkbox"/> Pull-type Vibratory Impactor |
| <input type="checkbox"/> 9-27-ton Duo-Pactor | <input type="checkbox"/> Self-Propelled Vibratory Impactor |
| <input type="checkbox"/> 10-30-ton Self-dumping Duo-Pactor | <input type="checkbox"/> Utility 6-yd Scraper |
| <input type="checkbox"/> 8-20-ton Tri-Pactor | <input type="checkbox"/> Bituminous Distributors |
| <input type="checkbox"/> 10-27-ton Tri-Pactor | <input type="checkbox"/> Street Flushers |

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William G. Ainsley, Wyoming state maintenance engineer and J. J. Evans, assistant, watching the Repaver on US 30 west of Rawlins.

Single Machine Remolds Rough Mat, Welds Hot-Mix Seal

"Repaving" is the term given to a process developed by an equipment maker for restoring rough or wavy asphalt pavements. Said to cost less than one-fourth the cost by conventional resurfacing methods, the procedure is the work of Cutler Engineering Company, which has developed a repaver for the purpose.

Repaving as outlined by this company's engineers, is based on the fact that the pavement must be heated to remodel it to a smooth surface. At 200 deg. F. or higher the asphaltic mix can readily be bladed and relayed. Burning is no hazard if kept below 300 deg. The method is advocated in place of ordinary use of a leveling course and a resurface, which does not always eliminate the bumpiness for long.

The leveling process of "repaving" shaves down the high spots and relays the material layer-by-layer in the valleys. Heated compaction rollers laminate this material to the existing mat. The road is restored to its original level and evenness, ready for traffic on a new hot-mix layer which serves in lieu of the usual liquid seal coat or surface treatment and chips. Produc-

tion rate is from 200 to 400 sq. yd. per hour.

Repaving consists of the following steps as carried out by William G. Ainsley, Wyoming state maintenance engineer and J. J. Evans, his assistant. They used the Repaver during 1960 to relevel and relay the existing asphalt concrete on US 30 between Rawlins and Laramie. It was employed also on another section of US 30 to correct some slick spots that had caused accidents; here the surface was merely heated and a new layer of stone chips rolled in.

Heating. Four large oil burners direct flames into a refractory lined firing chamber. A 5,000 lb. patented alloy grid roll operates inside this chamber to absorb some of the heat and transmit it to the pavement. The grid units float to give individual hot compaction to the pavement.

Leveling is accomplished by using a conventional grader blade, operating against vernier-adjusted mechanical stops. As the machine moves back and forth it shaves off the high spots and fills in the low areas. A special blade is available to operate as a conventional heater-

planer and waste material when this method is desired.

Compaction. The 25,000-lb. machine's rollers are kept heated to over 225 deg. F. Rollers exert over 300 lb. of compaction per lin. in. of width. The use of heat combined with compaction is considered an important step forward in asphalt highway maintenance.

Finishing. The machine carries on the front a specially designed hot-mix finisher which lays an even thin mat over a hot, newly leveled surface. The unit has a floating depth control which enables the operator to lay a uniform mat. The machine picks up mix from a truck-dumped windrow.

The combination of spreading heated mix over a heated mat and immediately compacted by heated rollers, eliminates the need for an asphalt tack coat according to the manufacturers.

Repaving has been field tested in 18 states on all types of asphalt pavement. This includes hot mix bituminous concrete, sheet asphalt and penetration type pavement. Repaving will work wherever a 1½ in. layer of existing pavement covers a good substantial base.

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NAUGATUCK CHEMICAL DIVISION



United States Rubber

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Latest Thinking on Compaction of Bituminous Concrete

Do your highway department specifications give contractors full opportunity to utilize the economies and compaction advantages inherent in rubber-tired rollers? This is one of several points raised in this review, which is abridged from a talk given by H. A. Radzikowski, Chief, Division of Development, Office of Operations, U.S.

Bureau of Public Roads. The occasion for this talk was the Third Annual Conference of the Connecticut Bituminous Concrete Producers Association, held at Northford, Conn.

In Mr. Radzikowski's full paper entitled "Compaction of Bituminous Concrete Pavements," his remarks on pavement rolling

were prefaced by a reminder that fullest use of drainage and compaction techniques is necessary for all components of the roadbed, from the foundation up.

A copy of the complete paper is available by addressing the author at Washington 25, D. C.

As in the case of soils, the first requisite to a good bituminous concrete surface is the adoption of a measurable engineering requirement, or end result characteristic—one that will give reasonable assurance for continuous stability of the surface during its service life. It is not sufficient to specify "thoroughly compacted," or to use other indefinite terms which cannot be readily checked with some yardstick.

A majority of the states now specify a percentage of density for the finished product. Some states base their percentage on theoretical density or the density of a voidless mixture. Others have adopted the more modern concept of relating field density to the laboratory design density.

In general, a requirement based on a laboratory density appears more desirable. This is because such a result can be achieved on the job without crushing the ag-

gregate or increasing the bitumen content, while at the same time allowing for bleeding during the summer and a small degree of densification under traffic. Experience indicates that a range of 95 to 98 percent of laboratory density provides for a desirable degree of compaction for bituminous concrete pavements.

It should be emphasized again that asphaltic mixtures should have sufficient stability to withstand the pressure of truck traffic during its most plastic condition. These pressures may be either dynamic or static and are more related to wheel load and tire inflation combinations than to axle loads. The dynamic pressures produced by the vehicle loading, the vehicle's springing system, and operating characteristics are currently the subject of considerable research and investigation.

The intensity of these pressures for various conditions may not be available for some time. There

are indications that a substantial deflection in a flexible pavement occurs when a truck is not in motion, or is moving at slow speed. Experience by the Illinois Division of Highways indicated that rutting in the wheel tracks is accompanied by further densification under traffic, particularly in the outside lane where truck traffic is most likely to be confined. Deformations as high as $\frac{7}{16}$ in. have been measured within 50 ft. of a traffic light, and up to $\frac{3}{8}$ in. at 100 ft. back of the light where braking effort is less severe.

Similar studies of asphaltic concrete surface courses on rural highways in Virginia have been the subject of research in that state. Two of the tentative conclusions are:

(A) That total deflection can be minimized by increased emphasis on compaction of all components of the pavement.

(B) That rutting in the wheel tracks results primarily from dis-



One of the new heavy-duty self-propelled rubber-tired rollers, seen working in conjunction with both two-axle and three-axle tandems, on an Interstate highway project in Kansas.

placements which occur within the top 4 in. . . ."

With regard to conclusion B, it is believed that no rutting of detrimental scope would occur if the pavement is compacted to at least 95 percent of laboratory density, if the underlying foundation is capable of adequate support.

Rutting of the asphalt surface is more likely to occur on climbing lanes, where truck traffic is moving more slowly, than on down-hill lanes. A factor in this rutting is the prevalence of oil drip on uphill lanes from laboring engines. In view of these conditions, information on static contact pressures exerted by truck tires is of considerable value. This is because there appears to be a relationship between static and dynamic pressures of both truck and compactor tires operating at low speeds.

Pneumatic Roller Advantages

The present approved practice

in a number of states for compacting asphaltic concrete is as follows: do breakdown rolling with a 3-wheel roller, intermediate rolling with a high-pressure tired pneumatic roller, and the final rolling with a steel wheel tandem type. Some of the advantages of pneumatic rolling at the intermediate stage are worthy of review. The pneumatic roller has demonstrated the ability to achieve a wide range of average contact pressures, including values comparable to and in excess of heavy truck tires. Also it has shown these additional advantages in the compaction of bituminous concrete:

1. The pneumatic roller imparts a more uniform density to the layer being compacted than steel wheel rollers. One factor responsible for this desirable result is the oscillation of individual wheels or pairs of wheels, which seek out low spots of the preceding course and fill them with compacted material as

necessary. Areas bridged over by steel wheel rollers may not be detected until the pavement is subjected to traffic. Wheel oscillation, which should be limited to movement in a vertical plane, would also help compact bituminous concrete shoulders at the pavement edge. This is particularly true where there is a marked break in cross slope between the pavement and the shoulder on superelevated sections.

Kneading action of pneumatic tires is another factor which contributes to more uniform density of the compacted layer. This action, furnished by the proper combination of wheel load and inflation pressure, provides an aggregate particle arrangement similar to that which would be achieved under traffic. Therefore, a type of stability is built into the pavement during construction which will minimize distortion and further densification under traffic.

A study conducted by the Texas Transportation Institute appears to bear out this contention. (A Limited Study of Laboratory and Field Density of Hot Mix Asphaltic Concrete by Bob M. Galloway, Texas A&M College; January, 1960.)

2. Pneumatic-tire compaction does an excellent job of sealing the surface from the entrance of water, which is particularly detrimental in freezing weather.

3. At comparable rolling speeds, the long oval print of the pneumatic-tire stresses a given area of the mix for a greater period of time than the transverse strip pattern of steel wheel rollers. This could account for the fewer number of passes normally needed to achieve the required density (usually 3 to 5 passes).

In addition, most self-propelled pneumatic rollers are wider than the steel wheel types. Some models are capable of completely covering a 12-ft. pavement lane in two series of passes. Machine characteristics such as just mentioned contribute to greater construction economy in states which permit contractors to use them.

4. Smooth-tread pneumatic roller tires are capable of producing a smooth pavement surface in many types of mixes, to an extent which may preclude the use of tandem rollers. Adoption of the pneumatic roller for both the intermediate and finish rolling would introduce even further economies into bituminous paving work.

5. In view of the ability to achieve uniform densities in a short period of time, the pneumatic roller would be more effective than steel wheel rollers for densification purposes near the lower limit of the permissible placing temperature range. This usually occurs in the spring and fall, when the mat is subject to rapid cooling. The use of pneumatics under these conditions could lengthen the paving season.

Of all of the above advantages, the most important one would seem to be the ability to impart the uniform density and kind of stability into the pavement that will hold up under the pounding of heavy truck tires. The Texas study shows that this inherent value of pneumatic rolling cannot be judged on the basis of substan-

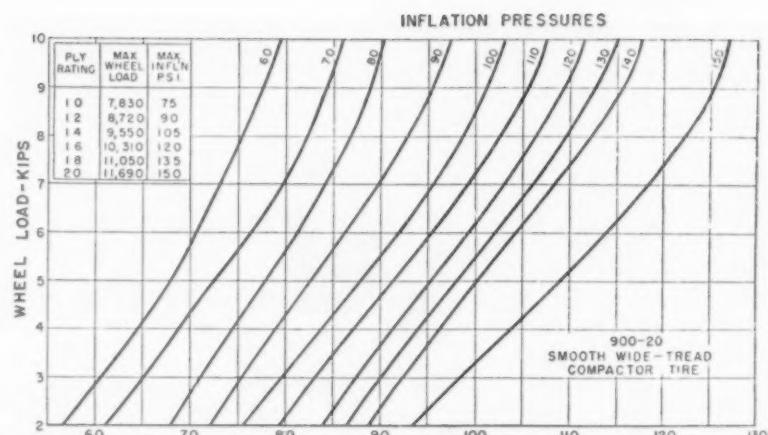


Fig. 1—Ground pressures psi for various inflations and wheel loads. (Plotted from data furnished by The Goodyear Tire & Rubber Co. June, 1960.)

tially increased density values, but rather on an appraisal of the in-service behavior of the pavement over many months.

Number of Rollers Required

Several states require a specific number of rollers per tonnage or area of pavement placed per hour. Such requirements do not always appear to be related to the ability of rollers to produce a dense and smooth surface. For example, a single roller whose output is limited to 25 or 30 tons per hour may be performing at only a fraction of its work capacity. The output of a paver-finisher would be limited to about 8 sq. yd. per minute for each roller placed behind it.

Production studies made by the Bureau of Public Roads show that 3-wheel rollers, operating in forward and reverse rolling, covered over 40 sq. yd. per minute on a 1-in. mat, while meeting a density requirement of 95 percent of the laboratory mix. This tonnage limitation therefore means that an excessive rolling requirement must be provided to achieve the productive capacity of a modern paver-finisher.

The 1960 California Standard Specifications for equipment required in compacting asphaltic concrete provide:

"The contractor will be required to furnish a minimum of one 12-ton 3-wheel roller or tandem roller, one pneumatic roller, and one 8-ton 2-axle tandem roller for each asphalt paver."

This is believed to be a reasonable requirement and is representative of current practice in a number of states.

Ohio's specifications let the contractor use fewer rollers than the minimum normally specified, density of 95 percent of the laboratory mix is being secured. Under this plan it should seldom become necessary to enforce the provision relating to the minimum number of rollers. Now that Connecticut is operating under a density requirement rather than a visual criterion, a similar procedure may be found to be desirable.

Compacting Temperatures

About a year ago, there was considerable difference of opinion as to pavement temperature at which high pressure pneumatic rolling would be most effective and what measures would be needed to prevent pickup of asphalt by the tires. The experience gained in the last year seems to indicate that pneumatic rolling is accomplished when the mix is below 200° F. A range of 150° to 180° F. appears to give good results at the intermediate rolling stage. Under these conditions, the mix is being densified at and slightly above the temperatures which the pavement will be subjected to during extreme summer heat. It would seem that compaction within 150° - 180° F. range is the ideal under which to build in the type of stability and aggregate arrangement which

Continued on page 128

Suburbans are better blenders
in the city. They're more
economical to buy and
keep. And they're more
economical to insure.



Mr. Cletus Dyer, Delano, California

HI-WAY SURFACE TREATMENT REPORT

Towed Paver Doubles Production on Half a Crew!

HI-WAY Model "AS" proves big capital investment not needed to build thriving blacktop business

"Without investing a great deal of money, I doubled my production and eliminated four out of the seven men I formerly had to use to help spread the asphalt," reports Mr. Dyer. "When we first started in blacktop work, we improvised a home-made paver, and it took us eight hours, using seven men, to spread 35 tons by hand. Now, with my HI-WAY 'AS' paver, I can pave an average driveway in two hours, approximately 150' in only one seam. Certainly, the spreader has helped me to bid on jobs we might have considered over our heads previously, and for my money, it's the best little paver for small parking lots or driveways."

Mr. Dyer's job on the parking lot for the Earlimart Veterans Memorial Building in Earlimart, California, (pictured here) called for 130 tons of hot asphalt. In the preparation for the paving of this parking lot, he first made an 8" fill and then applied 2" of rock dust, utilizing his "AS" spreader for this application, also. The parking lot is 60' wide

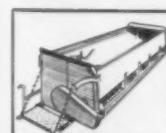
and 180' long. It will take seven seams of 2½" of hot asphalt. The screed is usually set at 2½" for parking lots—1½" for driveways.

However, the screed has been set as high as 8" quite frequently for spreading sand, dirt, and rock dust. In these applications, he usually sets the screed at 2". "Once when I was fixing a driveway," said Mr. Dyer, "I tilted the screed and used it as a scraper blade. It worked real fine. Last fall, when spreading oil dirt, we used the heated screed, and it was just wonderful."

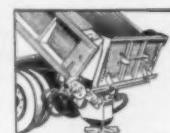
His last big job, other than driveways, was a parking lot for a drive-in-restaurant in Delano. This job called for 230 tons of asphalt. In another job calling for 470 tons for a parking lot for the Catholic Church in Delano, Dyer's 8-ton trucks deposited their load through the HI-WAY "AS" Spreader every (7) minutes. The mix used generally includes ¾" rock, asphalt oil, and sand.

"We have used our HI-WAY 'AS' Spreader to great advantage," continued Mr. Dyer. "We tie it right on to our truck and take it anywhere we want. A lot of new people are moving into this area and I expect quite a demand for parking lot and driveway paving."

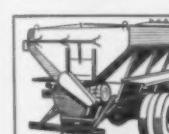
Your Nearby HI-WAY/MAN Can Demonstrate Every Type of Surface Treatment Rig



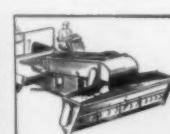
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COMPACTION OF BITUMINOUS CONCRETE

Continued from page 126

would be produced by high-pressure truck tires.

If rollers are placed on the mat at mix temperatures of 200° F. and over, it usually becomes necessary to reduce the tire contact pressure to prevent undue rutting and to take measures to prevent pickup. Tire manufacturers also advise us that temperatures in excess of 230° F. are damaging to the rubber.

When intermediate or densifying rolling is done at 150° F. or slightly higher, little or no pickup occurs on smooth-tread pneumatic roller tires, once the tire rubber is warmed up.

Traffic vs Roller Pressures

Previous mention has been made of the pressures produced by the rolling stock which uses the highway, and the relationship of pressures which modern tire for pneumatic rollers are capable of exerting. It seems desirable to discuss these topics in greater detail and

to give illustrations of how new tire engineering data can be used for better control in compacting bituminous concrete and other materials.

In the last three years, the tire and rubber industry has furnished considerable tire engineering data from which the average contact pressure exerted on the pavement by truck tires can be computed under static conditions for a flat surface.

These engineering studies show that the conventional truck tire for large transport trucks with 85 psi inflation will exert ground pressures at hot running conditions from 67 to 74 psi under legal load limits. Also that the higher pressure truck tires, including the steel fabric types, will exert ground pressures of from 79 to 88 psi at hot running conditions.

It seems logical that material subject to softening due to high ambient temperatures and friction, carrying considerable truck traffic,

should receive its intermediate rolling at contact pressures equal to or greater than that anticipated from trucks. Minimum rolling pressure of 80 psi has been suggested in relation to conventional truck tires having 67-74 psi contact pressures, and 85 psi for steel fabric and other tires carrying 79-88 psi.

It is suggested each state determine roller contact pressures suited to the traffic conditions.

The average steel wheel roller used today in intermediate or final rolling is usually limited to a range of average contact pressure of from 50 to 60 psi. Because of size limitations and crushing tendency of extremely heavy steel wheel rollers, it is not practical to achieve contact pressures of the order suggested with these roller types.

Pneumatic rollers are available which can exert contact pressure within a range of 80 to 95 psi or greater. Such rollers now are used by a number of states.

Much valuable data on this subject has been provided by The Tire and Rim Association and a tire manufacturer during the last year.

Table 1
Experimental Practice Tires for Compactor Vehicles

Tire Loads at Various Inflation Pressures. Maximum Speed—5 MPH.

Tire Size	7.50-15 (L.T.)	7.50-15	9.00-20	10.00-15	13.00-24	16.00-21	18.00-25	21.00-25	30.00-33
Inflation:									
35	2860 (4)	2940	5020	4730	9400	13120	18800	24000	49500
40	3090	3190	5420	5100	10180	14200	20300	26000	55500
45	3310	3420	5810	5470	10900	15200	21800	27800	57300
50	3520	3640	6180	5820	11600	16190	23200	29600	61000
55	3740 (6)	3840	6540	6150	12270	17130	24500	31400	64400
60		4040	6870	6470	12900	18000	25800	33000	67800
65		4240	7200	6780	13510	18890	27050	34600	71000
70		4440	7530	7100	14100	19700	28300	36100	74200
75		4610	7830 (10)	7370	14700	20500	29400	37600	77200
80		4790	8130	7660	15240	21300	30500	39000	80100
85		4950	8420	7930	15800	22100	31600	40400	83000
90		5130 (10)	8780 (12)	8210	16360	22800	32750	41800	86000
95		5290	9000	8460	16860	23550	33800 (24)	43200	88600
100		5450	9260	8720 (14)	17370 (18)	24250	34800	44500	91400
105		5620	9550 (14)	9000	17900	25000	35800	45700	94000
110		5770 (12)	9800	9240	18400	25660	36800	47000	96500
115		5920	10060	9460	18870	26300	37800	48300	99000
120		6070	10310 (16)	9700	19350	27000	38800	49500	101600
125		6210 (14)		9950 (18)	19800 (22)	27700 (28)	39650 (32)	50700	104000
130					20300	28300	40600	51900	106600
135					20700	28900	41500	53000	109000
140					21200	29600	42400	54300	111200
145					21600	30100	43200	55300	113500
150					22050 (26)	30800	44100	56400 (44)	115900 (64)
155						31400	45000 (40)		
160						31950 (36)			

NOTE 1: Numerals in parentheses are ply ratings. NOTE 2: Underscoring denotes maximum recommended loads for tire sizes and ply ratings shown. NOTE 3: (L.T.) indicates "light truck" rim. NOTE 4: For inflations in excess of 100 p.s.i., consult the rim supplier for rim strength and wheel design.

What Roller Wheel Loads?

As late as September 1959, when the Bureau held a meeting in Washington on "Compaction Equipment Requirements for Asphalt Pavements", tire companies were not in full agreement on the wheel loads considered applicable to various inflation pressures. Although maximum inflation pressures and wheel loads had been established for reasons of safety, there were no indications of desirable minimum values.

At the Bureau's request The Tire and Rim Association developed a tabulation of permissible "Tire Loads at Various Inflation Pressures" for the commonly used compactor tires. The underlined load value in Table 1 represent the maximum allowable for the indicated size and ply rating. The corresponding inflation pressures are also maximum for the respective size and ply rating. Wheel loads and inflation pressures can be varied within these ranges, if the wheel loads corresponding to the inflation values are not exceeded. For example, the inflation pressure in a 7.50-15 10-ply tire can be

Table 2

Approximate Tire Contact Pressure Ranges

For Tire Loads at Various Inflation Pressures Experimental Practice—Tires for Compactor Vehicles. As Recommended by Tire and Rim Association, February, 1960. Prepared by Division of Development, Bureau of Public Roads, from available tire engineering data.

Tire Size	7.50-15 (L.T.)-S	7.50-15-S	9.00-20-S	13.00-24-S	16.00-21	18.00-25
(Ply Rating)	Contact Pressure ¹ p.s.i.					
6	42-56	42-58	—	—	—	—
8	—	42-80	—	—	—	—
10	—	42-86	51-85	—	—	—
12	—	42-96	51-95	—	—	—
14	—	42-107	51-104	—	—	—
18	—	—	—	59-102	—	—
22	—	—	—	59-117	—	—
26	—	—	—	59-135	—	—
28	—	—	—	—	60.2-113	60.2-88
32	—	—	—	—	—	60.2-100
36	—	—	—	—	60.2-133	—
40	—	—	—	—	—	60.2-117

¹Average tire contact pressure on a flat surface.

²Data not available for 35 p.s.i. inflation. Values shown are for 50 p.s.i. inflation.

³Indicates available in smooth wide tread. For treaded tires, values shown are for gross contact areas.

varied from 35 to 100 psi with a wheel load of 2,940 lb.

The combinations recommended by this Association provide for suitable

tire deflections and a wide range of ground or contact pressures for various compacting con-

Continued on page 136

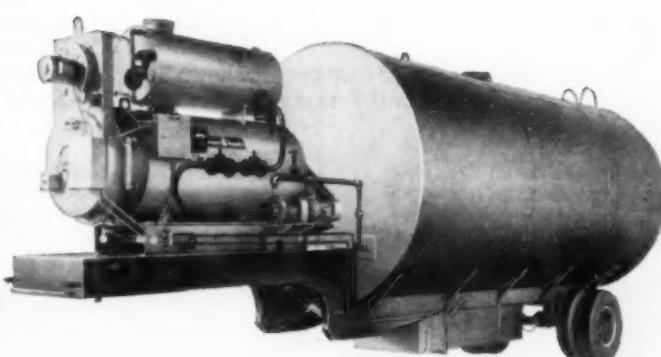
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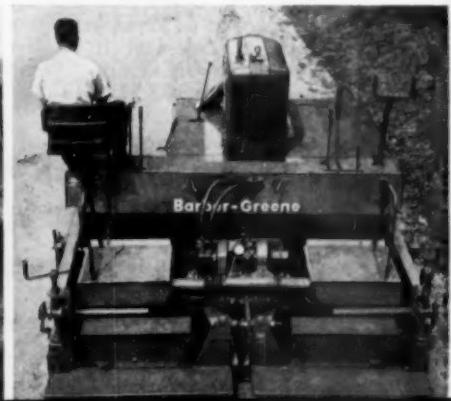
GENERAL DUTY: Model 879-B and new Model SA-40.

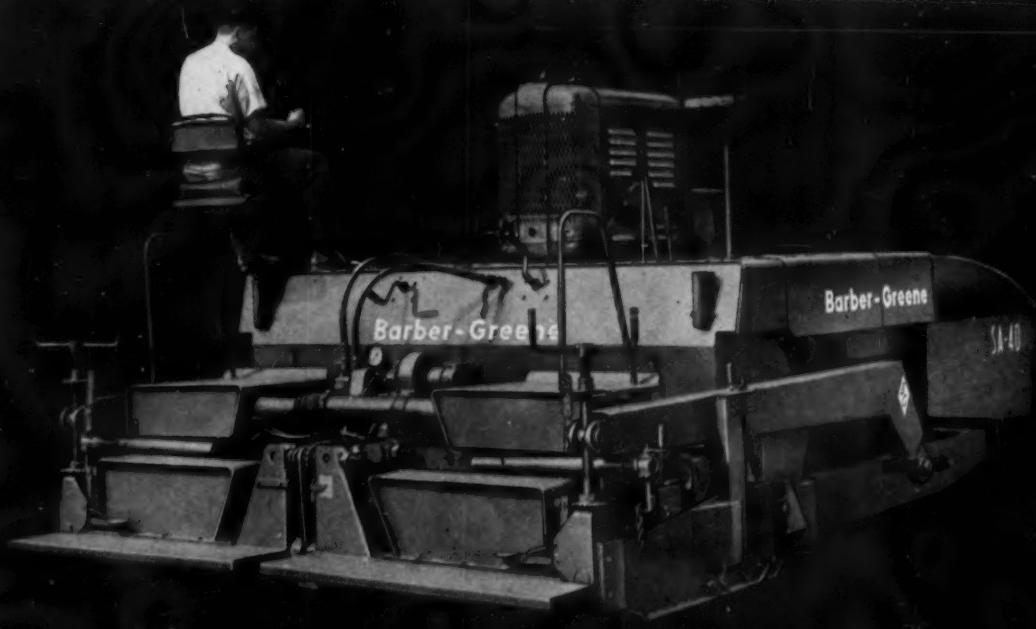
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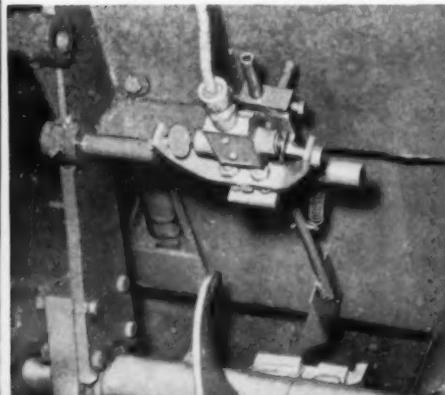


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Representatives from government agencies and contractor groups were on hand to watch placement of the experimental wearing course of asbestos-asphalt.

Delaware Builds Asbestos Asphalt Test Strip

Asphaltic concrete containing asbestos is undergoing tests on a 3,000-foot length of pavement in Delaware. The site is US Route 13, north of Smyrna. The strip incorporates 1,000 ft. of paving in which the binder course thickness has been reduced to 1½-in. and the wearing course to 1 in. giving a

total thickness of 2½ in. or ¾ in. thinner than that normally used for arterial paving in Delaware.

The test sections were constructed by the Delaware state highway department in cooperation with the Bureau of Public Roads. The department's testing laboratory staff under Stanley Scar-

borough, testing engineer, has charge of the project including choice of test area, design of mix, control of materials, and all future observation and testing. The asphaltic concrete was placed under direction of Horace Dyer, chief inspector of the department's New Castle County division.

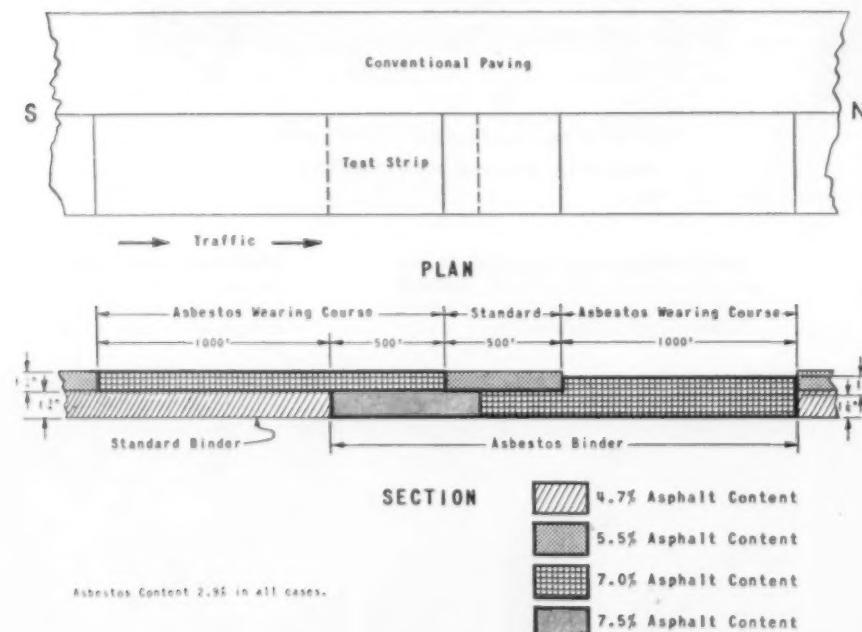


Diagram of Smyrna, Delaware, test strip showing design of pavement and asphalt content of various sections of binder and overlay. Heavy black line encloses sections containing asbestos. An asbestos content of 2.9 percent by weight was used in all asbestos-asphalt mixes.

Table 1
Asbestos-Asphalt Mixes

Material	Binder Mix 1	Binder Mix 2	Overlay
Sand ¹	940	947	1261
1/4 Scree Stone ²	471	471 ³	947
1/2 Scree Stone ²	447 ¹	472 ³	947
3/4 Scree Stone ²	1255	1262	
Asbestos Fiber (7M06) ³	100	100	100
Bitumen (70/85) ⁴	263 (7.5%)	245 (7%)	245 (7%)
Total Weight	3500	3500	3500
Mix Cycle	75 sec	75 sec	75 sec
Placement Temp. (°F)	300-315	300	300-320

Note 1. Screenings Note 2. Maryland Aggregate (trap rock) Note 3. Johns-Manville
Note 4. Texaco

Delaware Roads Company, Middletown, Delaware, a subsidiary of Warren Brothers, produced the paving mix and laid the pavement. The asbestos fiber used in the mix was produced by Johns-Manville Corporation under the firm's program of test strips of asbestos-asphalt in various states and Canada.

J-M's research program to date has indicated that asbestos-asphalt mixes containing up to 3 percent of asbestos fiber give a tougher road surface with increased resistance to concentrated loading under elevated temperatures, less brittleness under low temperatures, and increased resistance to weathering.

The Delaware long-time test for determining if the results of this research hold true for local road conditions and local aggregates, and for conventional thicknesses of binder and wearing course. Also if these advantages will allow a reduction in paving thickness.

The test section involved a widening and reconstruction project. This road carries an average of 9,750 cars and 3,111 commercial vehicles daily. The original portland cement concrete pavement was constructed in 1931 and widened in 1947. Due to underdesign for present traffic, the decision was to widen the road, patch some of the worst areas, and resurface with asphaltic concrete. The test strips were laid on the travel lane in an area judged to have the project's worst subgrade conditions. The passing lane was paved with conventional binder and wearing course, also to reduce thicknesses

as opposed to standard thickness section preceding and following the reduced thickness section.

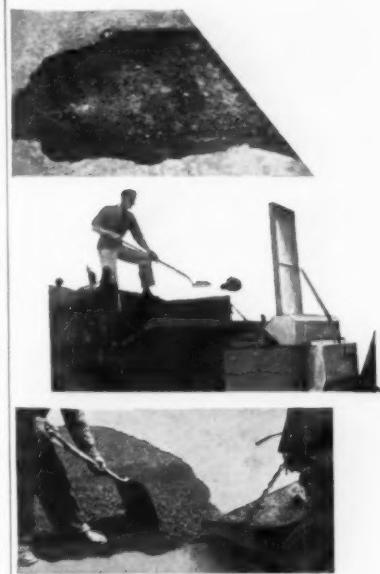
The accompanying cross-section illustrates the various mixes and thicknesses utilized for the 3,000-ft. strip. The strip began with 1,000 ft. of standard binder, having 4.7% asphalt content, followed by about 700 ft. of asbestos-asphalt content, followed by about 700 ft. of asbestos-asphalt binder containing 2.9% asbestos fiber and 7.5% asphalt. Standard 1 1/4-in. thickness was laid. This was followed by about 1,300 ft. of asbestos-asphalt binder, 1,000 ft. of which are reduced to 1 1/4-in. thickness, containing 2.9% asbestos and 7.0% asphalt. The changes in thickness from 1 1/4 in. to 1 1/4 in. and back to 1 1/4 in. at the end of the test area were accomplished gradually, of course.

The overlay on these various binder courses consisted of 1,500 ft. of asbestos-asphalt, containing 7.0% asphalt and 2.9% asbestos, followed by 500 ft. of standard mix containing 5.5% asphalt, both in the conventional 1 1/4-in. thickness. Next came about 1,000 ft. of asbestos-asphalt overlay reduced to 1-in. thickness and containing 7.0% of asphalt and 2.9% asbestos fiber.

Thus the test strip breaks down into an extremely varied sequence of mixes and thicknesses.

Mixing and laying of the test paving were done by the standard equipment normally utilized by Delaware Roads Company. The pugmill was a design that Warren Brothers and its subsidiaries utilize frequently. The asphalt was Texaco 70-85 pen. Grade 7M06 asbestos fiber, for a total of about 15

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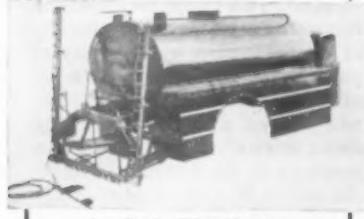
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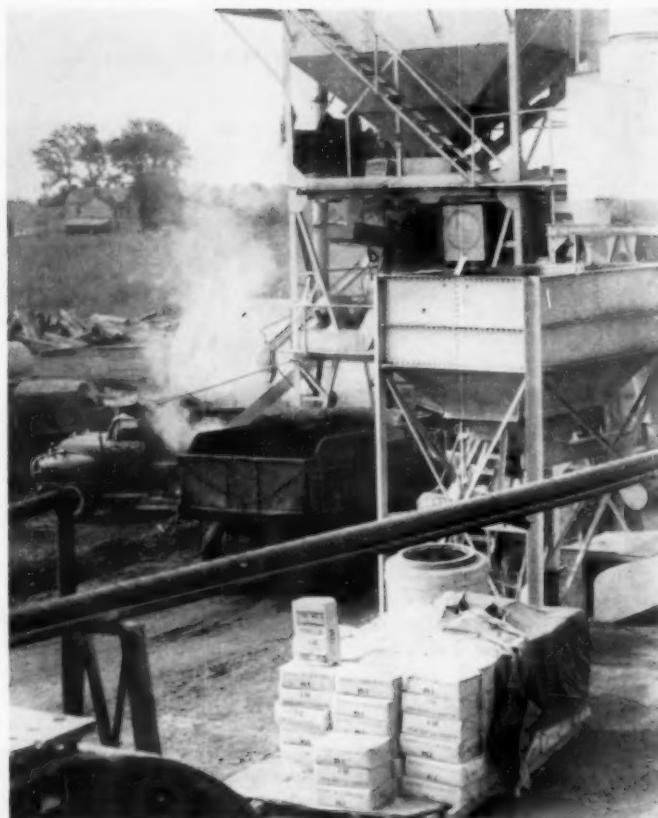


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Asbestos was added to the pugmill through wooden trough seen in photo. Bags were lifted several at a time to platform above trough. One 100-lb. bag of 7Mo3 was added to each batch.

tons was used in the project. Other mix components were rigidly controlled, so that there could be no question as to uniformity of sand or stone, and to its consistent properties for the entire test strip.

The only visual change in the mix as it came from the 3,500-lb. pugmill was a drier, slightly fluffier appearance. This was immediately apparent as each batch filled the waiting truck higher than normal. As a result, screed height on the Barber-Greene paver was raised 10 to 15 percent to assure that the desired final compacted thickness of paving was obtained. A 10-ton 2-wheel tandem roller was used, followed by a 12-ton 3-wheel tandem for final compaction.

Rolling of the materials gave a good tight pavement, without excessive pushing or tearing. The color of the asbestos-asphalt seemed to be more densely black than the conventional paving. This was attributed to the higher asphalt content, which was as high as 7.5% in a section of binder course. In

spite of the high asphalt content, there was no indication of bleeding or slicking.

Basically, according to Delaware highway officials, the tests were designed to determine the advantages in performance and future maintenance of standard thicknesses of asbestos-asphalt. In addition, laboratory flexural strength tests on asbestos-asphalt indicated that a 20 to 25 percent reduction of thickness would give the same basic laboratory properties as standard thicknesses of standard mixes. Particular attention will also be paid to the section having a 7.5% asphalt content in the base course. With the greatly increased resiliency, flexural strength, and decreased cold-weather brittleness, it is possible that reflective cracking, a common occurrence with asphaltic overlays on badly cracked concrete, may be minimized.

The program will be followed through with frequent visual examination, and periodic test cores, beginning after about two years.

Contractor Wins State OK On Small Aggregate Mixes

From Curtis B. Watrouse,
Vice President, Westchester Asphalt
Distributing Corp., White Plains,
N.Y.

To the Editor:

Answering your inquiry, a dense graded pre-mixed bituminous material under the State Code No. I38, has been gaining considerable prominence in the State of Connecticut. This material is also a patented product under the title of "Dix Seal."* The New York state department of public works was interested in the type of work that this material was used for, but felt that they would like to experiment with other types of materials rather than

definitely settling on the Dix Seal. Dix Seal, as you probably know, is a mix where practically 100 percent of the aggregate is minus the $\frac{1}{8}$ -in. sieve using about 7½ percent MC-5 as the binder.

We have made several private tests of our own on various types of paving and finally notified New York State that we were ready to demonstrate two of the mixes that we felt answered their requirements. Both of these mixes were laid in November, 1959, in the City of Rye. We changed the grading, having everything minus a $\frac{3}{16}$ -in. sieve, and used two different types of binders. One was with 85-100 penetration asphalt and the other was with the new Cationic RS-3K Emulsion.

The 85-100 mix was laid on top of cement concrete on about a 6 percent grade around a dangerous

curve. This area had been the scene of many accidents in wet weather. The material was placed about $\frac{5}{8}$ in. compacted finished thickness on top of a tack coat of about 5/100 gal. of RS-2.

The Cationic mix was used on an oiled surface also on a grade of about 6 percent. The contour of this road was very irregular which necessitated the material being placed from a thin layer to approximately 1 in. depth. The average thickness of this was also $\frac{5}{8}$ in.

Both surfaces have held up extremely well. Neither show any sign of stripping or pushing and have retained their skid-proof characteristics because of the silica type of sand used in the mix. Both jobs were spread with a rubber-tired portable Blaw-Knox paver and rolled with a 10-ton tandem roller.

We were very fortunate during this trial project in having many prominent men present representing the highway departments of both New York and Connecticut. The result was that New York State adopted the 85-100 mix and took bids this past spring using our specification in almost its entirety.

*See Roads and Streets, August, 1960, for review of New Hampshire's use of this mixture.

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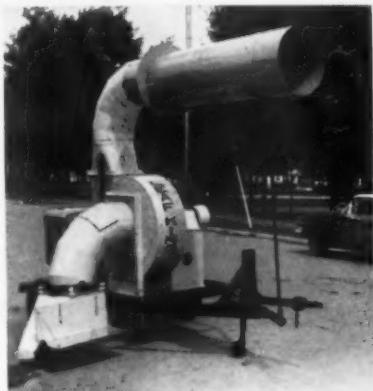


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ROADS AND STREETS, June, 1961

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COMPACTION OF BITUMINOUS CONCRETE

Continued from page 129

ditions and objectives.

The Bureau has also prepared Table 2 showing the "Approximate Tire Contact Pressure Ranges for Tire Loads at Various Inflation Pressures," as recommended by The Tire and Rim Association. (The first four tires listed from the left are smooth-tread types.)

Some of the earlier graphs and tables issued by tire and rubber companies for determining tire contact pressures were not readily adapted to field use. The Figure 1 chart greatly simplifies the determination of ground pressures. All that is necessary is to intersect the wheel load value in the chart with the inflation pressure curve, then read off the ground pressure directly. For example, a wheel load of about 5,700 lb. and inflation pressure of 90 psi will produce a ground pressure of 85 psi. Note that a number of wheel load-inflation pressure combinations are capable of producing ground pressures of 85 psi.

It should be emphasized, however, that in both the design and

applications of pneumatic rollers, a desirable amount of tire deflection must be maintained for all wheel load inflation pressure combinations. If contact pressures are obtained by extremely high inflations and light wheel loads, tire deflection will be negligible, thus eliminating the advantages of kneading action and possibly tire overlap between front and rear axles. Such overlap may be needed to insure full coverage. It is important the Tire and Rim Association's recommendations be followed.

Pneumatic Roller Specifications

Since the use of high-pressure pneumatic tired rollers is a relatively new practice in some states, it is only natural to expect some lag in the development of representative specifications. Some states continue to use rating criteria for pneumatic rollers which are not indicative of compacting ability. These include "pounds per inch of tire width." This is applicable only to the following: (1) to the

rectangular contact pattern produced by the drum of a steel wheel roller; (2) total tonnage ratings where compaction effort may be a function of roller width; and (3) to tire inflation pressure ratings which are not necessarily synonymous with tire contact pressure.

Even when two individual criteria, such as minimum wheel load and inflation pressure, are combined into a pneumatic roller requirement, it does not represent a specific baseline due to tire size variables. Ground pressures for the same wheel load and inflation pressure may vary by as much as 30 percent between tire sizes.

In view of the limitations of these rating methods, it appears that ground pressure or tire contact pressure is the only practical rating criterion for measuring the compactive effort needed for the compaction of asphaltic concrete mixes.

A number of states have adopted this criterion for their general pneumatic roller requirements on bituminous concrete pavements, thus taking advantage of the many new and efficient roller models now available. For example, Missouri

adopted the following Special Provision in December 1959 for compacting asphaltic concrete pavements:

"In addition to the compaction requirements of Section 7-3.0 of the Standard and Supplemental Specifications, special equipment which will satisfactorily compact mixtures of variable depths and over irregular areas will be required, between the breakdown and final rolling, on all courses. A pneumatic-tired roller, with 80 lb. per sq. in. in will be required. The Contractor shall furnish the engineer with information as to tire size, pressure and loading that will produce the desired result. A machine that has by past performance, proved capable of producing the required result may be considered for use."

The following is quoted from a Special Provision of the Oregon State Highway Department which was also issued by December, 1959:

"Pneumatic-tired rollers shall be of a multiple-axle, multiple-wheel type with smooth-tread pneumatic tires of equal size staggered on the axles at such spacings and overlaps as will provide uniform compactive pressure for the full compacting width of the roller, when operating. Oscillation of the wheels, if provided, shall be in vertical plane only. The pneumatic-tired roller shall be capable (a) of being ballasted sufficiently to bring its loaded weight to at least 2½ times its own weight, and (b) of exerting compactive ground pressures of as much as 80 pounds per square inch."

These notes cover some of the trends and developments that are having an impact on the construction of bituminous concrete pavements. If the door is opened to the full utilization of new developments of proven merit, then quality and economy of bituminous concrete pavement construction can be further improved.



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World Asphalt Meeting Planned for 1962

An International Conference on Structural Design of Asphalt Pavements is planned at the University of Michigan, August 20-24, 1962. It is scheduled by the U-M Department of Civil Engineering with the cooperation of the Asphalt Institute. Professor Ward K. Parr is executive secretary of the conference.

This unique meeting will serve as a world forum for presentation of engineering concepts concerning the structural requirements of asphalt pavements. It will include discussion of significant findings of the American Association of State Highway Officials (AASHO) Road Test and other field investigations.

The executive committee planning the conference includes: Dean S. S. Attwood, Professors W. S. Housel, Ernest Boyce, and Ward Parr, and Mr. C. V. House from the University; and J. M. Griffith and F. N. Finn from the Asphalt Institute.

The conference will cover both design and field performance. Papers and discussions will report specially designed road tests, investigations of pavements in service, laboratory and theoretical studies. The meeting is timed to follow the release of the AASHO Road Test results and will provide the opportunity for review, discussion, and critical analysis of these data.

The conference agenda will also include pavement performance criteria, strength evaluation of pavement structures and their components, soil conditions, drainage, climatic effects, dynamic factors, and the structural contribution of asphalt bases and overlays.

Further details may be obtained from Professor Ward K. Parr, Department of Civil Engineering, University of Michigan, P.O. Box 619, Ann Arbor, Michigan.

Asphalt Surfaced Road Mileage Increases

Asphalt-surfaced mileage on the state highway systems has nearly doubled since the end of World War II, according to figures compiled by The Asphalt Institute, from summary statistics published annually by the U. S. Bureau of Public Roads.

The National Bituminous Concrete Association gets another new member. James H. Flood of Walter H. Flood Company, Chicago (seated) is filling out membership sheet for NBCA's membership committee chairman, William Nanini, head of Rock Road Construction Company, Chicago.



VOLUME 29 OF THE PROCEEDINGS OF THE ASSOCIATION OF ASPHALT PAVING TECHNOLOGISTS FOR 1960 is off the press. It includes papers on drying and heating of aggregates, quality mix control, effects of fillers, wire reinforcement, composition and properties of asphalt, testing methods, epoxy resins and other

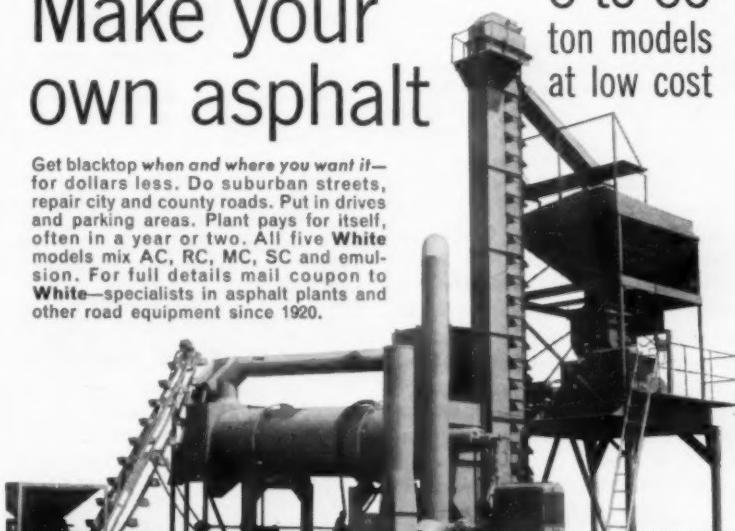
additives, and laboratory simulated traffic testing.

The Proceedings may be obtained from the Association's headquarters, Box 619, Ann Arbor, Michigan, at \$6.50. A chronological, author, and subject index of AAPT's Proceedings through 1956 is also available free on request.

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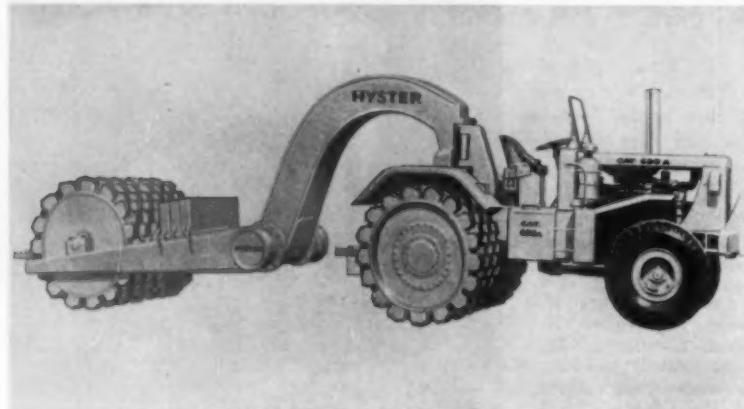
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NEW PRODUCTS *Continued from page 115*



Hyster's C400B Compactor

Compactor Operates Up to 15 MPH

A new Hyster compactor, the C400B, has been introduced by the Hyster Co., Tractor Equip. Div.

The new machine operates as an integral part of the new Caterpillar 630 A tractor. Rear tractor wheels are replaced with compacting wheels; a gooseneck trailing roller contains two similar wheels. Existing tractor axles, brakes and bearings are used for the tractor compaction wheels. With the compaction wheels designed for top effectiveness at high speeds, the unit offers high production compaction in all classes of soil up to 15 mph. Width covered per pass is 10 ft. 10 in. Turning radius for both tractor and compactor is 17 ft. 3 in.

The new compactor utilizes tamping wheels designed to compact soil efficiently at top speeds and achieve almost complete "walk out", states Hyster. The C400B employs a sloped-pad tamping foot—an exclusive feature with Hyster—which enables drive wheels to develop more tractive effort than flat pads. A variety of ballast combinations may be applied to meet job requirements. Ground reactions for the unit are in excess of 15 tons per set of wheels.

Hyster Co., P.O. Box 328, Peoria, Ill.
For more details circle 117 on Enclosed Return Postal Card.

Rear-Mounted Rippers

A heavy duty rear-mounted, hydraulically operated ripper for the Austin-Western Pacer 300 motor grader is the latest addition to American Tractor Equipment Corp. line of Ateco rock, pipeline and general-utility rippers.

Designed for the 300, the new ripper is mounted on the rear of the grader frame where the weight of the engine permits maximum down pressure on the points. Rear mounting also retains



ATECO Ripper

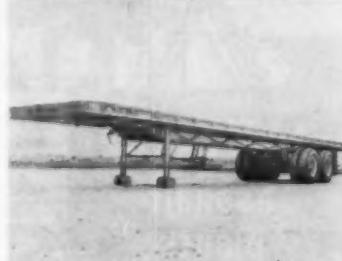
steering control, improves traction and keeps drive tires on smooth material rather than that material already ripped. The tool beam is controlled by two hydraulic cylinders, standard tool beam will take up to 5 shanks. An optional tool beam will take either 5 ripping shanks or 9 scarifier shanks for shallow ripping.

American Tractor Equip. Corp., 9131 San Leandro Blvd., Oakland 3, Calif.

For more details circle 118 on Enclosed Return Postal Card.

Giant Platform Trailers

A half ton of weight has been eliminated from Dorsey Trailers' new line of Giant Platforms, according to an an-



Dorsey's Giant Platform

nouncement by that company. At the same time, capacity ratings remain at 44,000 lb. for the standard model and 60,000 lb. for the heavy-duty line.

The new model DGTL weighs 9,100 lb. in 40 ft. length with 10.00 x 20 tires and the West Coast model DGTWL weighs 9,800 lb. with 10.00 x 22 tires and Budd disc wheels. Both types have 1½ in. floors of fir. Other weight-saving changes include elimination of body border trusses and substitution of lighter versions of several non-load-bearing parts. The modified lines still have the 18-in.-deep pressed steel main frame, 1¼ in. diagonal pipe braces have been added to extend the main frame to the ends of the floor sills.

Dorsey Trailers, Morris Timbs, Inc., 220 St. Michael St., Mobile, Ala.
For more details circle 119 on Enclosed Return Postal Card.

Short Wheelbase Truck

The production of a new Model 32S hi-tensile strength steel truck has been announced by the KW-Dart Truck Co.

The steel used throughout the truck reduces parasitic weight to a minimum. The rig will deliver 32 tons of payload on a short wheelbase, making it highly



KW-Dart 32 S

maneuverable. Tires are 18.00 x 25 - 24 ply all-around. The Cummins V8-350 engine is a 350 hp. diesel. A heavy-duty transmission provides 10 speeds forward and two in reverse. A torque converter is optional. The truck's empty weight is 44,675 lb.

KW-Dart Truck Co., 1301 N. Manchester Trafficway, Kansas City, Mo.
For more details circle 120 on Enclosed Return Postal Card.

Heavy Duty Tires

A new line of heavy duty nylon cord tires for graders and trucks used in heavy construction industry have been introduced by the Harmo Tire & Rubber Co.

The new Harmo Tri-State brand tires have two nylon cord shock plies in addition to their normal 6 to 12 ply ratings. The full size and depth tires are available in either traction or highway treads. The tires are available in sizes 600 x 16 to 1000 x 22 with ply ratings ranging from 6 to 12. Grader tires are available in sizes 1300 and 1400 x 24.

Harmo Tire & Rubber Co., 1800 W. Fort St., Detroit 16, Mich.

For more details circle 121 on Enclosed Return Postal Card.

Cleveland Deck Finisher



Adjustable Bridge Finisher

A new adjustable bridge finishing machine for paving bridge decks has been placed on the market by Cleveland Formgrader Co., manufacturers of street and highway paving equipment.

The machine, reported to eliminate the procedure of hand finishing bridge decks, is light weight and easily maneuvered, handling from 20 to 55 ft. Bolt-on truss-type extensions in 5 ft. increments make it possible to extend the 20 ft. main section in this manner. It is reported that the new machine has finished 32 cu. yd. per hr. of concrete with acceptable surface results.

Cleveland Formgrader Co., Mills Rd., Avon, Ohio

For more details circle 122 on Enclosed Return Postal Card.

New Tractor Cabs

Maximum operator protection is provided, according to an announcement by the manufacturer, in a heavy duty cab designed and built by Crenlo, Inc. for Caterpillar 630 4-wheel tractors.

Protection features of Crenlo's model SC630A include a $\frac{3}{16}$ in. steel canopy and structural steel members which are welded to the cab and braced to the tractor frame. Heavy steel guards at the top and rear and a steel grill over the back window further shield the operator.

Other new cabs introduced are: Model C630 A, for standard heavy



CHC630A Standard Heavy Duty Cab

duty; Model TC630A, specially designed for tractors equipped with Tractionaiders; Model CHC630A, a coal hauler model with special features for strip mining; and Model STC630A, engineered for hazardous operations. All cabs feature roll-down windows, vents, insulated ceilings and large windshields with tinted glass to prevent glare.

Crenlo, Inc., 1600 Fourth Ave., N.W., Rochester, Minn.

For more details circle 123 on Enclosed Return Postal Card.

New Hydraulic Systems

A new hydraulic system for all blades used on the model C-6 tractor has been announced by Euclid Div. of General Motors, and Gar Wood Industries. Designed to meet the speed requirements of the Torquatic Drive C-6, the new hydraulic package consists of a single cylinder and variable



Euclid C-6—New Hydraulic System
volume piston pump known as the Gar Wood Variacs.

This Variacs pump provides a number of advantages especially important to crawler applications. It delivers oil only when needed for raising and lowering the blade. Controls are easily operated and positioned for convenience of the operator . . . they are power actuated, eliminating mechanical linkage. Literature describing the new system and a complete range of blades and attachments for the C-6 is available from Euclid or dealers.

Euclid Ad. Dept., Hudson, Ohio

For more details circle 124 on Enclosed Return Postal Card.

... for more details circle 299 on enclosed return postal card

POKER? Play to win!



How would you play this hand?

One chance in five to fill this flush, so be sure the pot is at least five times as big as the bet. If you haven't passed openers, raise. In general, a timid "calling" game is a losing game. Play percentages, but push them hard.

Here's a sure winner from FORD:

Latest addition to the world famous Fordson diesel line of tractors—the new Fordson Super Major. New disc brakes, differential lock, comfort seat and many other new features give a new peak in Fordson performance.

Still the same reliable engine, however—the dependable 42.6 drawbar H.P. engine which has earned a reputation for fuel economy unmatched by any other engine in its class.

Fordson Dexta Diesel tractor is better, too. Improved hydraulic system, transmission and styling make it a better buy than ever before. Get details from your Ford Tractor Dealer, or write:

**Tractor and Implement Division
Ford Motor Company
Birmingham, Michigan**





EIMCO 126 FRONT END LOADER

HOW DO YOU KNOW YOU ARE BUYING THE BEST FRONT END LOADER?

If you haven't thoroughly checked the Eimco 126 Front End Loader, you don't! Strong claim . . . but no stronger than the facts. Eimco crawlers are engineered and constructed to a standard of quality and craftsmanship unmatched anywhere. Engineered and built by the world's most experienced producer of underground rock loading equipment, its heritage is apparent in its far heavier steel castings, massive, sturdy components and ability to outproduce, outload, outmaneuver and outlast any other crawler-loader in its class. Before you buy your next loader, check the facts on the dependable Eimco series.

Request the address of the branch or dealer nearest you and see this powerful machine demonstrated. Please write for Bulletin LS-1126.

The **EIMCO** corporation
Head Office Salt Lake City 10, Utah, U.S.A.
Export Office: 32 South St., N.Y.



"Advanced Engineering and
Quality Craftsmanship
Since 1884"

B-729

... for more details circle 352 on enclosed return postal card

140

Pneumatic-Tired Roller

A new nine-wheel pneumatic-tired roller has been introduced by the Austin-Western Div. of Baldwin-Lima-Hamilton Corp.

Designed for capacity of four to 11 tons, the roller, known as the PR-11—is capable of maximum compaction ef-



fort of more than 90 lb. per sq. in., with optional high-inflation tires. Features include: Warner 4-speed transmission with full power shuttle reverse and torque converter; automotive-type power booster steering; all-wheel oscillation to maintain uniform compaction; six-ply tires and 152-gal. sprinkler water tank. Wheels are individually removable for quick-change. Hydraulic service brakes are provided on each drive wheel, beside an independent parking and emergency brake system.

Austin-Western Div., Baldwin-Lima-Hamilton Corp., Aurora, Ill.

Austin-Western Roller—4 to 11 Tons

For more details circle 125 on
Enclosed Return Postal Card.

Heavy Roller Variable Tire Pressure

The Grace 30 ton self propelled pneumatic roller is now available with "Varipressure" tire equipment for changing tire pressures while moving.

In compaction of hot mix asphalt, particularly when no light breakdown roller is used for the first passes, too lb. and more tire pressure is to much for initial compaction, yet high air pressures are needed for final compaction if maximum density is to be obtained. This often creates the need for easily and quickly varied tire pressures. The model 30 B may be changed from 60 to 120 lb. pressure while in motion, or to 150 lb. if extra ply tires and a 2-stage compressor is furnished. Tires are connected to a common manifold by rotating unions, and pressure may be increased or decreased in a few minutes without stopping.

W. E. Grace Mfg. Co., 6007 S. Lamar St., Dallas, Texas

For more details circle 126 on
Enclosed Return Postal Card.

Continued on page 148



TROJAN

**Builds in "Extra" Strength with
one-piece side frame construction**

Trojan cuts the entire side frame from extra-heavy steel for maximum strength, durability, and operational simplicity . . . Obviously, this is a more costly operation; but the results are worth it! . . . The smooth, continuous contour completely eliminates the undercuts for bracket attachments necessary in ordinary built-up frame sections — therefore, eliminates the possible stress concentrations that lead to frame failure . . . This also allows complete protection *inside the frame* for fuel lines, wiring and hydraulic lines — shielded by a solid wall of steel from possible damage during rough work. This advanced Trojan technique means fewer

parts and closer dimensional control — plus the elimination of potential trouble spots due to joining members that may not be of uniform strength . . . In addition, Trojan's unique "wide foot" design of frame connection adds rugged strength to the rear cradle supports. The frame is just another example of the extra care that goes into the construction of every Trojan — extra care that results in complete dependability on the job . . . Ask your Trojan distributor for a point-by-point inspection or an on the job demonstration of Trojan's seven-model line with lift capacities from 7,000 to 24,000 lbs.

AD NO. 44-33

TROJAN®
TRACTOR SHOVELS
YALE & TOWNE

**THE YALE & TOWNE MANUFACTURING COMPANY
TROJAN DIVISION • BATAVIA, NEW YORK**

... for more details circle 348 on enclosed return postal card



IN WADENA, a road-mixing machine passes over the windrow, mixing the aggregate and Texaco MC-3 Surfacing Material.

IN WASECA, an asphalt distributor "shoots" a windrow as blades follow close behind to road-mix the aggregate and Texaco MC-3 Surfacing Material.



Paving rough roads with Texaco Asphalt keeps county road costs low

Both Wadena and Waseca, two Minnesota counties, use the most economical and efficient method of paving rough farm-to-market roads. They add new gravel to the existing road and apply Texaco MC-3 Surfacing Material.

This inexpensive method provides safer, smooth, all-weather roads. It's also fast. And maintenance costs are relatively small.

Here's the way the highway departments of both Wadena and Waseca Counties handle these road-building jobs.

- First: their crews bring in new gravel, dry it and windrow it. Then pressure distributors "shoot" the windrows in several passes until they incorporate about 5% of the Texaco MC-3 Surfacing Material in the mix.
- Blades and a road-mixing machine follow up the distributor, mixing the aggregate and surfacing material until the two blend perfectly. Graders then distribute the mixture evenly across the road.

• Rubber-tired rollers follow through, giving the mix its initial compaction. A steel wheel roller then puts the finishing touches to the dense, durable 1½-inch surface. **Texaco Asphalt Cements and Liquid Asphaltic Materials** offer contractors a wide choice of pavement types for road-building, airport runways and private parking areas. If you'd like to know more about these asphaltic products, write for our two technical booklets: "Road Building with Texaco Asphalt" and "Plant Mixed Texaco Asphalt Pavements." Write: *Texaco Inc., Asphalt Sales Division, P. O. Box 2332, Houston 1, Texas.*

Tune In: Texaco Huntley-Brinkley Report, Mon. Through Fri.-NBC-TV

TEXACO
ASPHALT

Chicago 4 • Denver 1 • Houston 1
Jacksonville 1 • Minneapolis 3 • Richmond 25

ROADS AND STREETS, June, 1961

FOUR STEPS to better secondary roads with COLUMBIA CALCIUM CHLORIDE



1. PREPARE. Make a master plan to cover future growth of your communities. Determine the eventual use of each road, and bring the roadway width, alignment and drainage to these standards.

2. SHAPE UP. Place the first course of stabilized aggregate wearing surface. Columbia Calcium Chloride provides dust control while helping to hold the fines moist and keeping the aggregate in place.

3. BUILD UP. As budget and traffic load permit, add the dense graded base which will provide the support needed for future traffic needs. Again Columbia Calcium Chloride contributes its moisture-holding and binding properties to a better driving surface, proper compaction, and protection against loss of fines or ravelling of top surface material.

4. FINISH UP. When you are ready to add hard paving, you'll find the aggregate base needs a minimum of reshaping or additions of material when Columbia Calcium Chloride has been used properly. The final job is superior, because of compaction and strength of the base.

By following this progressive plan, you can give more people better roads for more of the time, and still keep on budget. Residents appreciate knowing what improvements are coming, and they like the safer, more comfortable driving on dust-free aggregate roads treated with Columbia Calcium Chloride. Send for the booklet,

"A Program for Progressive Improvement of Secondary Roads." It gives all the details.



columbia southern
chemicals

CHEMICAL DIVISION

PITTSBURGH PLATE GLASS COMPANY
ONE GATEWAY CENTER PITTSBURGH 22, PENNSYLVANIA

DISTRICT OFFICES: Boston • Charlotte • Chicago • Cincinnati • Cleveland
Dallas • Houston • Minneapolis • New Orleans • New York • Philadelphia
Pittsburgh • San Francisco • St. Louis • IN CANADA: Standard Chemical Limited

Columbia Calcium Chloride
One Gateway Center
Pittsburgh 22, Pennsylvania

Please send me a copy of "A Program for PROGRESSIVE IMPROVEMENT of Secondary Roads."

Name _____

Title _____ Organization _____

Address _____

City _____ Zone _____ State _____

... for more details circle 291 on enclosed return postal card

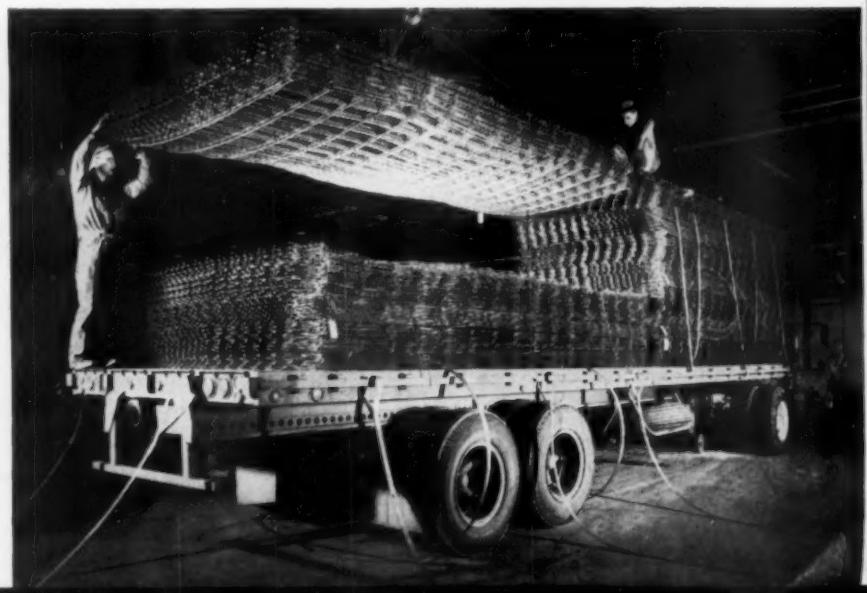
New Hinged Road Fabric from Pittsburgh Steel folds in slightly more than half the fabric's full width. Here in Glens Falls, N.Y., where Torrington Construction Co. of Connecticut is building a 14-mile strip of the \$275-million Northway, Job Superintendent Patrick J. DiNatale shows how new fabric folds along hinge running length of the sheet.



Pittsburgh Steel's New Hinged Road Fabric Big Success On New York State's Northway

Contractor Saves About One-Third Installation Time

Ready to go at Pittsburgh Steel's Monessen, Pa., plant is a flat-bed truck loaded with new Hinged Road Fabric. Ordinary road fabric requires special cradling equipment and extra handling. Not so with Pittsburgh Steel's new Hinged Road Fabric: it's shipped folded flat and in weights up to 40,000 pounds per truck (depending on size and style), twice that of ordinary fabric. Shipments to Glens Falls took only a day.



A revolutionary new road fabric from Pittsburgh Steel Company simplifies shipping, speeds handling and cuts installation time on roadbuilding jobs by as much as one third.

The new product, called Hinged Road Fabric, provides the steel backbone for a 14-mile strip of New York State's gigantic, \$275-million Northway linking Albany with Canada.

Hinged Road Fabric features an off-center hinge running lengthwise on each section. Roadbuilders using this product—one of several being introduced by Pittsburgh Steel—cite its built-in benefits during:

- **Shipping**—Because Hinged Road Fabric's novel hinge permits folding in slightly more than half the fabric's full width, it can be stacked easily within the eight-foot width limit of a truck bed or gondola. This makes special cradle trucks and cradling equipment unnecessary.

As a result, trucks can be loaded to capacity (subject to state weight restrictions)—up to twice the weight possible with ordinary fabric.

- **Handling**—A single section of Pittsburgh Steel Hinged Road Fabric can be handled easily by two men instead of the four usually required for unwieldy ordinary sheets.

- **Installing**—Because the sheet is not bent during shipping and stacking, new Hinged Road Fabric lies flat when installed.

At Glens Falls, N.Y., where 800 tons of Hinged Road Fabric were installed on the four-lane, 175-mile Northway, Torrington Construction Co.'s veteran roadbuilders added their stamp of approval.

Patrick J. DiNatale, the Connecticut firm's job superintendent, was especially enthusiastic about the one-day service on Hinged Road Fabric truck shipments from Pittsburgh Steel's Monessen, Pa., plant.

"We get terrific service from Pittsburgh Steel," said Mr. DiNatale. "It takes just one day for a shipment to get here."

"Ordinary fabric usually takes a week to ten days to arrive because it's handled by truck, rail and then truck again. That's because many counties and cities won't permit trucks with overhanging loads to pass through.

"Pittsburgh Steel's fabric is handled only once—and in one day in loads up to 40,000 pounds, not 20,000."

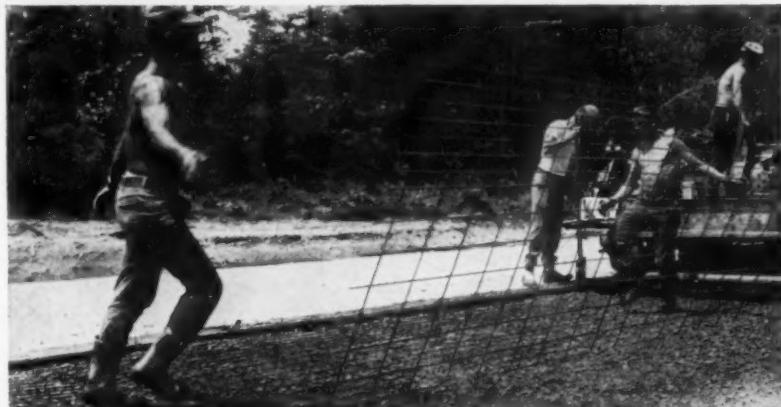
Torrington's field engineer, Robert B. Cunningham, is enthusiastic about Hinged Road Fabric's fast, easy handling. He said:

"I estimate that at the end of a working day this Pittsburgh Steel fabric saves us about one-third the installation time required with ordinary fabric."

The man directly in charge of the



On the job in Glens Falls, N.Y., a section of Hinged Road Fabric is handled easily and quickly by just two men.



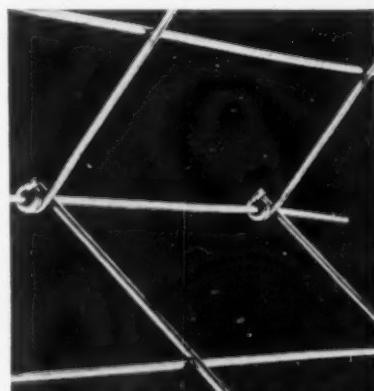
Down goes Hinged Road Fabric in just seconds—and as flat as a living room rug.

fabric's installation—Paving Foreman John Picciocca who has worked with all brands of road fabric for the last 12 years—had this to say:

"What really sold me on Hinged Road Fabric is that it doesn't poke through the concrete while it's taking a set. That's a big problem with ordinary fabric. When that happens, you either have to cut the wire or repave the spot to cover the wire. That's murder on costs."

If you're in the roadbuilding business, you'll be dollars ahead—like Torrington—when you let Hinged Road Fabric provide fast, economical reinforcement on your next job.

Contact your nearest Pittsburgh Steel Products sales office listed here.



Unique hinge is the result of two years' development work.

Hinged Road Fabric

Patents applied for

Pittsburgh Steel Products

a division of Pittsburgh Steel Company

Grant Building

Pittsburgh 30, Pa.



DISTRICT SALES OFFICES

Atlanta Cleveland
Chicago Dallas

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Los Angeles Pittsburgh
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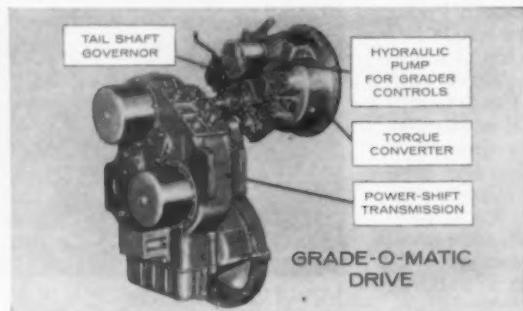
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You're miles ahead in performance with GALION GRADERS on the job. They're built to put more WORKPOWER at the blade

HUSKIEST GRADERS BUILT. You get strength to spare from Galion's extra-rugged frame. It's engineered for low-maintenance operation . . . for extra years of cost-cutting performance.

MORE "PUSH-POWER." Full working capacity results from the careful weight-to-horsepower balance built into Galion graders. You get more "push-power" at the blade. That's where power counts most.

EXCLUSIVE GALION DESIGN teams up with heavy-duty engine, rugged transmission, power-booster steering and centralized controls to speed operation. Result is a bigger day's work with less fatigue.



GRADE-O-MATIC DRIVE—THE ULTIMATE in efficient grader operation. It combines torque converter drive, power-shift transmission and tail-shaft governor to provide fully automatic power application.

TORQUE IS MULTIPLIED automatically. Meets varying power needs without constant shifting. Grade-O-Matic operators are free to concentrate on more efficient blade work on every job.



For information on graders from 58 to 220 hp., and weighing up to 42,000 lbs., contact your Galion distributor or write for latest catalog data. The Galion Iron Works & Mfg. Company, Galion, Ohio, U.S.A.

THE GALION IRON WORKS & MFG. COMPANY, GALION, OHIO, U.S.A.



... for more details circle 310 on enclosed return postal card

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General and Export Offices, Galion, Ohio, U.S.A.—Cable Address, GALIONIRON, Galion, Ohio

ROADS AND STREETS, June, 1961



GALION®
ROLLERS AND GRADERS

**MILES
AHEAD**

NEW PRODUCTS *Continued from page 140*



Thirty-ton self-propelled road building machine compacts a first layer of gravel, exerting 700 lb. per lineal in. compression load. The unit is the Seaman DuoPactor, model 10-30 RD. This self-propelled power train and the drive wheels were manufactured by the Moline Automotive Div. of Minneapolis-Moline Co., Hopkins, Minn. The DuoPactor is manufactured by the Seaman-Gunnison Div. of Seaman Corp., Milwaukee, Wis.

Automotive Div., Minneapolis-Moline Co., Hopkins, Minn.

For more details circle 127 on
Enclosed Return Postal Card.

Truck-Mounted Excavator

An excavator with the power of bigger models and the economy of smaller units has been announced by Harschfeger Corp.

The machine, P&H Model 155B-TC, is a 15-ton capacity, truck mounted unit capable of working as a backhoe, dragline, clamshell, shovel or crane. According to a company announcement the new machine is economical because of its width and axle weights, which meet all state requirements eliminating permits and special fees. One of the exclusive features of the 155B-TC is the power box design, a system which completely encases and continually lubricates major gears and shafts. Sealed off from dirt and grime, gears and shafts will not wear as quickly. Lubricating costs are reduced because the machine need only be greased once a year. Also featured is



P&H 155B-TC Excavator

the P&H planetary gear-type boom hoist. The boom is not only raised under engine power, but on this machine the boom is also lowered under power instead of by force of gravity.

Construction & Mining Div., Harschfeger Corp., 4445 W. National Ave., Milwaukee 46, Wis.

For more details circle 128 on
Enclosed Return Postal Card.

Piston Type Hydraulic Pump

A variable volume piston type hydraulic pump has been announced by Gar Wood Industries, Inc. Called the Variacs, the new pump is now standard



Gar Wood Pump

equipment for attachment operation on the Euclid C-6 crawler tractors.

The most important advantage of

the Variacs pump is operating hydraulic attachments on heavy duty equipment such as tractors, according to company representatives. No oil is pumped into the hold position and only the amount of oil required to do the job is pumped making more horsepower available for traction. The piston assembly contains nine pistons which rotate with the cylinder block. When the piston assembly is tilted, each piston sucks oil into the cylinder block during half of the rotation and forces it out during the other half. The greater the tilt, the greater the volume.

Gar Wood Industries, Inc., Wayne, Mich.

For more details circle 129 on
Enclosed Return Postal Card.

High-Capacity Trailers

Six new high-capacity trailers have been introduced by Athey Products Corp., that company announced recently.

The redesigned line has been based on new developments in the hauling field with attention concentrated on



Athey PR 619—One of Six New Models

increased payloads. Key factor in the increase and speed is the use of "T-1" steel. The use of this new material permits thinner body section and greater strength, according to the company. All six trailers feature standard Athey advantages, such as with, non-rigid design for maneuverability and low center of gravity. The new line is now available from Athey-Caterpillar dealers.

Athey Products Corp., 5631 W. 65th St., Chicago 38, Ill.

For more details circle 130 on
Enclosed Return Postal Card.

Construction Hardware Line

A complete line of hardware for the construction field is now available from the Williams Form Engineering Corp., according to an announcement from that company.

Available are panel ties and assemblies, scaffold planking of aluminum, bridge decking jacks, form plugs and wedge hickey splicers. Every kind of form or forming material is said to be available from Williams. Gang form is another complete product line manufactured by Williams.

Williams Form Engineering Corp., 751 N.E. Lombard, Portland 11, Ore.

For more details circle 131 on
Enclosed Return Postal Card.

Bullwheel Assemblies

New bullwheel assemblies for mounting on existing reel dollies have been announced by Petersen Engineering Co., Inc.

The new models, No. 5000-U and 6000-U are identical to those used on the well known 5000-STR-1 and 6000



Petersen Bullwheels

series tensioners. The company states that the assemblies can be mounted on almost any existing reel. Each assembly consists of a pair of multi-groove Neoprene-lined aluminum alloy bullwheels with tension brakes. Direct knob brake control is provided without intermediate linkage. A fairlead assembly is included so that the unit may be mounted at the usual angle of 75 deg. when the reel will be carried on the same trailer, or down to 22 deg. when the reel will be carried on the same trailer, or down to 22 deg. when carried on a separate trailer.

**Petersen Engineering Co., Inc.,
Santa Clara, Calif.**

For more details circle 132 on
Enclosed Return Postal Card.

Auto Arresting Barrier

A new concept in auto arresting has been designed and is available from vanZelm Associates who specialize in arresting systems for military services. According to an announcement by the manufacturer an auto can be stopped with safety to the occupants and minimum damage to the vehicle.

Designated the "Dragnet" the device uses a net to drag the car to a safe but sure stop with maximum deceleration of about 3 times that of an emergency stop using normal wheel brakes. The device is simply attached to a permanent object on either side of the road. The Metal Bender, a device containing steel tapes, will feed out the tape via a series of rollers to produce a tension of 2500 lb. With a Metal Bender on either side of the road the total stopping force is 5000 lb. The company states that the theory is to absorb energy. The stopping net is made of light-weight nylon webbing which can be easily rolled and stored.

**VanZelm Associates, 7803 Pulaski
Highway, Baltimore 6, Md.**

For more details circle 133 on
Enclosed Return Postal Card.

ESSICK

VIBRATING COMPACTORS



Essick VR-72 Triplex Unit on Yuma Marine Auxiliary Air Station Job

COSTS CUT 2¢ PER YARD ON 1,000,000 CUBIC YARDS

SUNDT AND BEVANDA INCREASE COMPACTION PRODUCTION
FROM 13,000 TO 18,000 CUBIC YARDS PER DAY

N. Pat Richardson, Project Manager for M. M. Sundt Construction Co. and M. J. Bevanda Co., Inc. of Yuma, Arizona writes:

"You will be interested to know that we were very impressed with the performance of our Essick VR-72 Vibrating Compactors on our recently completed Yuma Marine Auxiliary Air Station job. As you know, we used three VR-72's in a triplex hook-up which compacted a pattern of sandy silt 17-feet 8-inches wide. The job, under the jurisdiction of the 11th Naval District, called for 13,300' of Runway 200' in width, and 17,500' of taxiway 75' in width.

The one triplex unit of Essick VR-72's, along with 3 pushers and 10 scrapers allowed us to load, spread, and compact up to 18 thousand cubic yards in an 8 hour shift. We originally used other methods of compaction but the one Essick VR-72 Triplex Unit increased our production from 13,000 yards to 18,000 cubic yards per 8 hour day, and our compaction costs were reduced approximately 2¢ per cubic yard.

The material was a sandy silt with an average plastic index of 6. We put down in excess of 1,000,000 cubic yards on the complete job and in our opinion, the performance of the Essick VR-72's gave us a more successful and profitable job with greater production and lower costs."

For either low or high plastic index soils, there is an Essick Vibrating Compactor designed to produce greater compaction, at less cost for any compaction requirement.



9 Models of Vibrating Compactors from 13" to 72" widths

Also 14 Models of Tandem Rollers from $\frac{1}{2}$ to 14 Tons

ESSICK MANUFACTURING COMPANY

1950 SANTA FE AVENUE
LOS ANGELES 21, CALIFORNIA

Affiliated with THE T. L. SMITH CO., Milwaukee, Wisconsin

850 WOODRUFF LANE
ELIZABETH, NEW JERSEY

... for more details circle 297 on enclosed return postal card

1957-58-59-60-61...

The new product that paved the way for new methods:

BROS 30-TON SELF PROPELLED PNEUMATIC TIRE ROLLER



BROS SP730B roller, ready for delivery to U.S. Navy. Also manufactured in Australia and Brazil, hundreds are in use around the world.



Subbase compaction, BROS SP730B equipped with tread tires, as used by Berne's Construction Co., Indianapolis, Indiana, on Federal Highway contract.



BROS SP730B at work on Gardenmoen Air Field, near Oslo, Norway. Korsbrekke and Lark and Norske Destillationsverker A/S were cooperating contractors.



BROS SP730B compacts 9" loose calcium-chloride treated base material to 6" in experimental job of Highway Surfacers, New Hampton, Iowa.

- Developed to provide compaction in all courses to match pressures of dual-wheeled over-the-road trailer trucks. 1957 Ohio tests showed that with 8500 lb. wheel loads on 3" hot mix asphalt concrete, random tests of void content varied less than 2%, core samples averaged 99.9% of design.

- 1958 Columbus Air Base project showed 98.5% density could be achieved in 3 passes at 280-300° mix temperatures instead of usual 300-325°. Also, a harsher mix was permitted.

- Minneapolis Belt Line job showed roller achieved over-specification Marshall densities, and after one night's heavy traffic, could further increase density the next day with repeat rolling.

- 1959: "test rolling," another first for BROS SP730B self propelled pneumatic tire roller. It has been widely used for test rolling or proof procedures to meet state specifications requirements.

- 1960—BROS engineers perfect "air-on-the-run" for SP730B, allowing tire pressures to be raised or lowered from 30 to 100 psi without stopping, without changing ballast. Adapter kits offered for all SP730B's already in use.

- Iowa experimental project shows lower construction costs, superior base obtained, with calcium-chloride added to base material and rolled immediately with the BROS SP730B.



"Air-on-the-run" on the BROS SP730B roller, first tested by Alley Construction Co., Faribault, Minn.

For further information on new methods described here . . . and for full information on the BROS SP730B SELF PROPELLED PNEUMATIC TIRE ROLLER, Write:



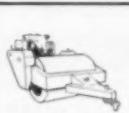
ROAD
MACHINERY
DIVISION

BROS Incorporated

1057 TENTH AVENUE S. E.
MINNEAPOLIS 14, MINNESOTA



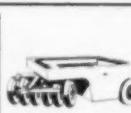
20-TON SELF-
PROPELLED
ROLLER



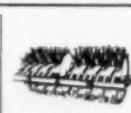
VIBRA-PACTOR



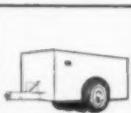
25,000 LB.
SELF-PROPELLED
ROLLER



10 AND 15-TON
ROLLERS



SHEEPSFOOT
TAMPER



25-100 TON
ROLL-O-PACTOR

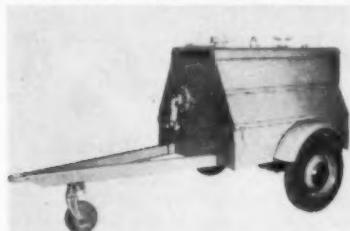
BROS Products also manufactured in Australia and Brazil

... for more details circle 286 on enclosed return postal card

Single Stage Portable Compressors

A new line of single stage portable compressors which are available in sizes up to 250 ft. is being manufactured by the Worthington Corp., Harrison, N.J.

Reported to be the simplest design on the modern market the new Worth-



Available in sizes from 85 ft. to 250 ft., this unit features only 79 parts.

ington line is the first to carry a full year warranty. Frank Nunlist, company VP stated that the company is "going all out for design", but noted that the industry could not sacrifice service or operating cost for any design.

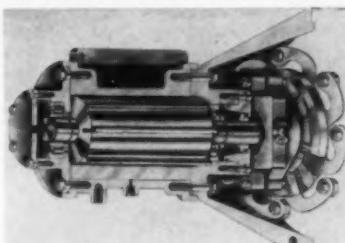
The simplest compressor design was made possible by a Worthington developed rotor-to-cylinder oil sealing. Only one cylinder, one rotor, one set of bearings and one high pressure seal is required. This eliminates gears and

For more details circle 134 on Enclosed Return Postal Card.

oil pumps and reduces parts replacement.

Fred Seel, general manager, reports that the machine was field tested under all conditions from Alaska to Argentina.

Worthington Corp., Harrison, N.J.



A cross-section shows the machine has only one cylinder, one rotor.

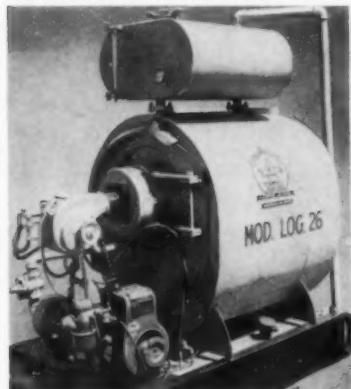


Ease of accessibility is featured on the new Worthington Mono-Roto.

Circulating Hot Oil Heaters

A new addition to the line of Chilدرس line of circulating hot oil heaters with gasoline driven power has been announced.

The manually operated, self-contained device is recommended for use



Little Devil

where electric power is not readily available. It is equipped with a standard pull-rope starter and has a 90 gal. fuel oil tank and separate 5 gal. gasoline tank. The device, known as the Little Devil, is insulated with a 2 in. fiberglass covered with metal skin.

Childers Mfg. Co., Inc., 2010 6th St., Northwest, Albuquerque, New Mexico

For more details circle 135 on Enclosed Return Postal Card.

New Angle Blades

A new high strength steel angle blade for two models of the Michigan line of rubber tired tractor dozers has been announced by the Construction Machinery Div. of Clark Equip. Co.

Designed for use on Models 180 and 280 tractor dozers, the new blade may



Angle Blades for Michigan 180-280

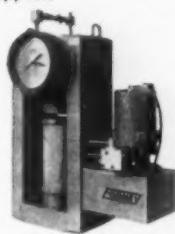
be angled 25 deg. right or left. This is reported valuable for finish grading, ditching construction and utility dozing work. A "C" frame is provided as an integral part of the frame. For both models the maximum tilt is 8 in., reports the manufacturer.

Construction Machinery Div., Clark Equipment Co., Pipestone Plant, Benton Harbor, Mich.

For more details circle 136 on Enclosed Return Postal Card.

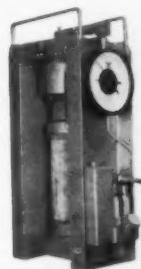
FORNEY CONCRETE TESTERS

meet the exacting requirements of the construction industry's concrete testing applications. Forney engineers are proven specialists in the concrete testing equipment field. For eleven years they have furnished the industry with quality testing equipment, accessories and supplies.



MODEL FT-30 HEAVY-DUTY PORTABLE CONCRETE TESTER

Latest addition to a complete line of portables, the FT-30 brings laboratory performance right to the job site. Self-contained power unit eliminates cumbersome hose and manual pumps. Loading speed is completely variable for accurate conformance to current ASTM standards.



MODEL FT-10 "JOBSITER"

Lowest priced tester with high priced features. 250,000 lb. load rating designed to protect operator from flying fragments. Fully protected gauges equipped with instant connectors.

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Cable: Forney's, New Castle

... for more details circle 301 on enclosed return postal card

New Barricade Flasher

A new versatile barricade flasher that incorporates optical acrylic lens specifically designed for the device has been introduced by Dietz Co.

Twin 7 in. amber lenses mount in a visored diecast head assembly. The en-



Dietz Versatile Flasher

tire head may be swiveled 180 deg. for positive aiming. Bulb replacement and service is accomplished by removing one screw in the housing. The device operates on a 6 volt battery and will flash 65 times per minute for about 750 hr., reports the manufacturer. Available with 30 optional circuits, the flasher is reported capable of meeting any state specifications.

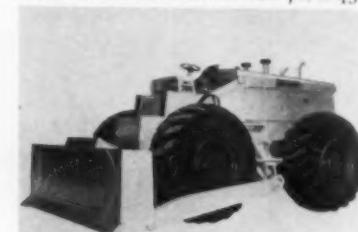
R. E. Dietz Co., 225 Wilkinson St., Syracuse 1, N.Y.

For more details circle 137 on Enclosed Return Postal Card.

New Power For Tractor Dozers

Two new horsepower-increasing engine options for the Michigan Model 380, Series II tractor dozer have been announced by the Construction Div. of Clark Equipment Co.

The new engines coupled with other design modifications have resulted in both power and production increases, according to an announcement by Clark. First of the optional motors is the GM model 12V-71, a 430



hp. diesel. It is a 12 cylinder, 2 cycle engine with 851.8 cu. in. displacement and can produce 1210 ft. lb. of torque. The second optional available is a Cummins model NVH, a 12 cylinder diesel rated at 450 hp. This engine is a 4-cycle engine with 1486 cu. in. displacement and produces 1232 ft. lb. of torque. Both units have a 24 volt electrical system.

Driven through the Clark power

train, the new model 380 has a top speed of 28.6 mph. in forward or reverse. The drive line consists of a construction machinery type 3:1 multiplication factor torque converter, 4-speed power shift, and all-wheel drive. The power shift is the full reversing type with a selector for 2 or 4-wheel drive. Like all the Michigan machines, this one has rear-wheel steering and a front axle with locking type differential.

Clark Equipment Co., Pipestone Plant, Benton Harbor, Mich.

For more details circle 138 on Enclosed Return Postal Card.

Tension Control Wrench

A new air powered tension control wrench has been developed and is being manufactured by the Gardner-Denver Co.

Frictional resistance in bolt tightening is overcome with the new wrench, assuring solid construction. A built-in standard control permits adjustment of the wrench to obtain tension from $\frac{1}{2}$ to 100 percent of the elastic limit of the bolt. This clamping force is reported to be accurate regardless of such variables as burrs, irregular threads, rust or scale. Different bolt sizes may be used by the adjustment of a set screw. Two models are available. The 18B-7T is a $\frac{3}{4}$ in. and the 18B-9T, which is rated a $1\frac{1}{4}$ in.

Gardner-Denver Co., Quincy, Ill.

For more details circle 139 on Enclosed Return Postal Card.

Jump-Type Compactor

The production of a new jump-type compactor has been announced by the Master Vibrator Co. of Dayton, Ohio.

The self-propelled "Jumping-Jack", as it is known, is a one man operated machine using power stroke directly on

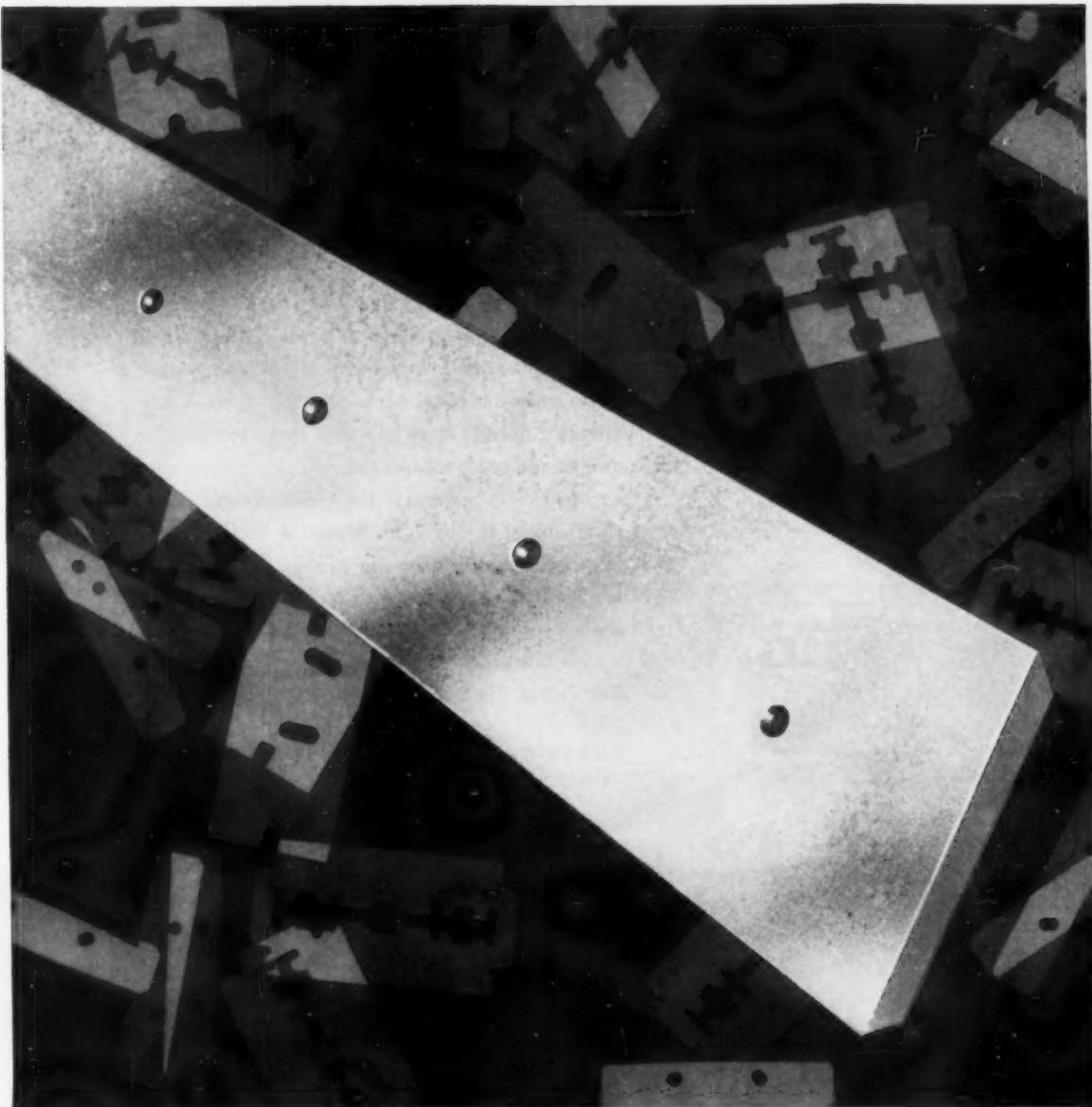
... for more details circle 296 on enclosed return postal card



the center of gravity. It is suggested effective for compacting many types of soil. Weighing only 120 lb., it is portable and will deliver 350-700 nine hundred lb. blows per minute. The ramming device and gear box are sealed against dirt and it is self lubricating. Features of the machine include a lift eye, carrying handle and rewind starter. The fuel tank is a .6 gal. capacity, or 1 1/2 hr. of running time.

Master Vibrator Co., 1752 Stanley Ave., Dayton 1, Ohio

For more details circle 140 on Enclosed Return Postal Card.



Looking for a way to shave your downtime costs?

Then you need CF&I Grader Blades and Cutting Edges. Made from tough, abrasion-resistant steel, they're especially designed to give you *extra* service on the toughest earthmoving jobs... to scrape the waste off your operating costs... and to keep your profit-and-loss sheet

looking attractive at all times.

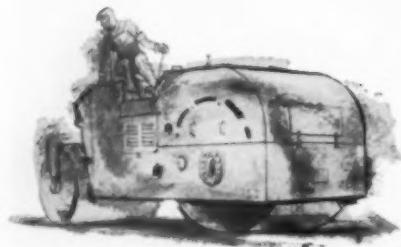
Your CF&I distributor has a complete line of blades and edges for bulldozers, scrapers, snowplows, graders and other earthmoving equipment. Call him today for complete details and speedy delivery.

The Colorado Fuel and Iron Corporation
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... for more details circle 290 on enclosed return postal card

Profit insurance built in

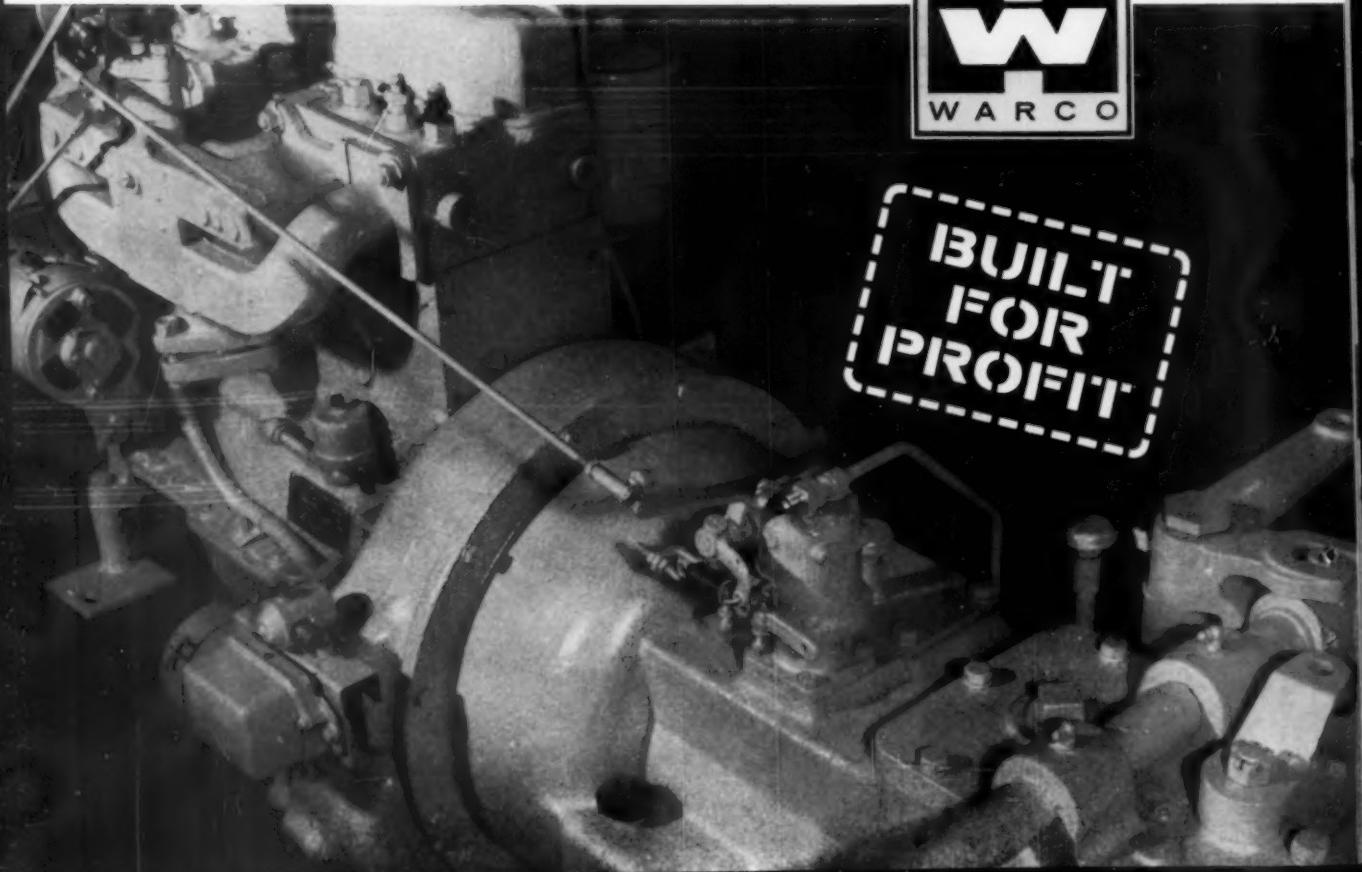


Economy of operation is probably one of your most important considerations when purchasing new equipment. It's one of our prime concerns, too. That's why there is a torque converter and tail shaft governor on every Huber-Warco tandem roller. What does this mean to you? It means power when you need it for faster, better jobs at less cost. For instance, the Huber-Warco torque converter doubles available power — instantly, cuts fuel consumption, does away with the master clutch, scuffing, stalling and overloading. And most important, increases the life of the engine, gears and other vital parts as much as 50%. The operator doesn't have to worry when working on grades either, because the tail shaft governor automatically maintains the rolling speed, within close limits, set by him. Means a better rolling job, too, because after he presets the speed he can forget it and concentrate on the job. These are but a few of the benefits you get with Huber-Warco tandem rollers. Check your Huber-Warco distributor. He'll give you all the details.

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Materials Handling Hand Truck

A new, rugged materials handling hand cart, the WN-12, has been announced in production by the Getman Brothers of South Haven, Mich.

Known as the Scoot-Crete, it is operated by a driver who walks behind the



Getman's Materials Hand Truck

unit to steer. The one ton capacity unit has hand operated breaks and throttle which also operates the two speed, centrifugal clutch transmission. Direction is controlled on this three-wheel machine by handlebars through the rear castor wheels. Measuring only 72 in. long and 35 in. wide, it can be completely turned around in a 12 ft. area.

Getman Bros., South Haven, Mich.

For more details circle 141 on Enclosed Return Postal Card.

Work/Downtime Recorders

Recent improvement in construction of work-time/downtime recorders are reported to better serve the users. Recorders can be installed on every type of motorized off-highway equipment to enable the management to understand better minutes and hours of work and production or non-work periods. One



Off-Highway Operation Recorder
of the latest improvements is the free-swinging pendulum on which a stylus is mounted to mark the chart through vehicle side-sway motion.

Three recorder models are recommended for off-highway equipment by the Service Recorder Co. All contain clock mechanisms which will rotate a chart while stylus marks broad lines,

indicating busy time or narrow lines to show stop or idle time. The recorders are useful in that they show the management what is being done with the machine and how much use it is getting. It also shows the maintenance people exactly when machine should be taken to the shop, without banking only on the odometer. Charts available can cover from 4 to 72 hours of operation.

Service Recorder, 1017 Rockwell, Cleveland 14, Ohio

For more details circle 142 on Enclosed Return Postal Card.

Tire Changing Methods

A recently introduced method of changing truck tires without the hazards of hammering and prying with bars was announced by the Par Sales Co., Inc.

The new piece of machinery, known as Break-Safe, consists of a conical shaped base, a spider assembly consisting of four cross arms, a screw shaft and handle and two sets of pressure pads. The wheel is seated on the con-



Break-Safe

ical base and the pads positioned to maintain even distribution of pressure on the bead. The rotation of the levers breaks the bead with ease, reports the manufacturer. It is reported to make it impossible for lock rings to fly off the rims during re-inflation.

Par Sales Co., Inc., 1647 N. Gower St., Hollywood 28, Calif.

For more details circle 143 on Enclosed Return Postal Card.

Reversing Conveyor Belts

A patent covering the latest "twist" in conveyor belts has been issued to B. F. Goodrich Industrial Products Co., according to an announcement by that company. The new belting system is reported to allow belts to twist themselves automatically, reversing top and bottom surfaces after delivery and before accepting the new load.

The company states that the object of the twist-type belt is to position the clean side of the belt on top of the return idlers. This prevents build-up of tacky materials on idlers or pulleys, accumulations which can damage idler

equipment and shorten belt life. This action is accomplished by placing two twist pulleys at each end of the belt flight. Each set of twist pulleys turns the belt 180 deg. The belt's thick carrying cover is always positioned to receive the load and the return idlers contact only the clean side.

The system, according to the company, can be applied to any conventional conveyor system now in operation without altering the machine framework. Wet materials can be handled at low temperatures with no danger of the belt freezing to pulleys and idlers.

B. F. Goodrich, Akron, Ohio

For more details circle 144 on Enclosed Return Postal Card.

Concrete Curing Blankets

A new and reportedly simple method of curing concrete has been announced by the Packaging Products & Design Corp.

Known as Curene concrete curing blankets, the new product is said to eliminate re-wetting concrete, eliminates water wagons and saves the cost of water. The material gives even water absorption and distribution to eliminate dry spots.

Packaging Products & Design Corp., 850 Frelinghuysen, Newark 12, N.J.

For more details circle 145 on Enclosed Return Postal Card.



IDEAL FOR... PLAT PLANS PROJECT PLANTS

File constructed in 200 lbs. test corrugated container.

9 TUBE MODEL Tube I.D. 4 1/8"

MODEL NUMBER 0930 0936 0942

Size	31	37	43
Inside depth	30 1/2	36 1/2	42 1/2
Price	\$11.50	\$12.00	\$12.50

16 TUBE MODEL Tube I.D. 3 1/8"

MODEL NUMBER 1630 1636 1642

Size	31	37	43
Inside depth	30 1/2	36 1/2	42 1/2
Price	\$12.00	\$12.50	\$13.00

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SOLD DIRECT ONLY

25 and 49 Tube model avail. Write for brochure.

ROLL & FILE SYSTEMS, INC. F. O. BOX 3863 DETROIT 5, MICH.

... for more details circle 336 on enclosed return postal card

Manufacturers' Literature

NEW PUBLICATION: Applications of basic metal products are described in a new magazine being introduced by National-Standard Co., Niles, Mich.

The products include stainless, high-carbon, copper-plated and specialty steel wire; decorative, protective and screening grades of perforated and pierced metal; wire cloth; high-carbon spring steels; and special machinery for wire handling and metal lithography. The new publication is called National-Standard News Digest.

For more details circle 146 on Enclosed Return Postal Card.

STEEL BAR: A new 4-pg. brochure on Laclede high strength steel reinforcing bars for concrete construction has been published by Laclede Steel Co., Arcade Bldg., St. Louis 1, Mo.

The brochure highlights the new high strength steel bars manufactured in conformance with ASTM standards. The booklet illustrates how each bar carries a rolled-in marking identifying its size and strength. A brief explanation of Straight Line Analysis and Ultimate Strength provisions of A.C.I. building code is also given.

For more details circle 147 on Enclosed Return Postal Card.

AUTOMATIC BLADE CONTROL: A new, full color sound motion picture en-

titled "Dial It" has been issued by the LeTourneau-Westinghouse Co., Peoria, Ill.

The 12-min. film strip illustrates and explains the function of Preco Dial-A-Slope, the automatic blade control attachment for motor graders. The 16 mm film has simple dialogue and animation to clearly illustrate each point.

For more details circle 148 on Enclosed Return Postal Card.

READY-MIX/DUMP TRUCKS: A new brochure describing the model 6-627, ready mix and dump truck has been issued by the FWD Corp., Clintonville, Wis.

Designed for states with special requirements and weight restrictions, the brochure illustrates typical legal loading of the 6-627 in both models. Also described is the principle of true all-wheel drive.

For more details circle 149 on Enclosed Return Postal Card.

CONCRETE FORMING SYSTEM: The best methods of waling and bracing its concrete system are described in a drawing offered without charge by Symons Clamp & Mfg. Co., 4249 W. Diversey Ave., Chicago 30, Ill.

The recommendations, contained in a single 17 x 20 in. sheet, are suitable

for mounting on a wall as a handy aid. Prepared by Symons, the recommendations cover the common methods of waling, bracing and assembling.

For more details circle 150 on Enclosed Return Postal Card.

RUNWAY IMPROVEMENTS: Reports on nine important airport projects in the U.S., Canada and the Dominican Republic are covered in a new 20-pg. publication available from Master Builders Co., Cleveland 18, Ohio.

The roles played by Rozzolith in obtaining the high quality concrete required for this work and Masterplate's providing wear-resistant, non-dusting concrete floors for hangers, cargo and other buildings are discussed.

For more details circle 151 on Enclosed Return Postal Card.

VIBRATION SCREEDING: A new pamphlet giving detailed information on how to accomplish vibration screeding is available from Stow Mfg. Co., 443 State St., Binghamton, N.Y.

The bulletin explains the advantages of vibration screeding and where screeds can best be used. Also information on the detailed procedures for screeding are given for use on floors, highways and bridge decks.

For more details circle 152 on Enclosed Return Postal Card.

MOBILE CENTRAL MIX: A new two-color, 4-pg. brochure fully describes the high-capacity, completely mobile central mix concrete plant recently developed by Erie Strayer Co., Erie, Penn.

The plant's unitized component sections, each with its own running gear for over-the-road towing by truck tractors, are illustrated.

For more details circle 153 on Enclosed Return Postal Card.

ROAD WIDENER: A new, 12-pg bulletin covering the Barber Greene model SJ-50 Road Widener and shoulder paver is off the press and available from Barber-Greene, Aurora, Illinois.

The first machine to lay all materials including tamped and level hot asphalt mixes, the model SJ-50 offers portability, versatility and handling ease.

Continued on page 168

For more details circle 154 on Enclosed Return Postal Card.



It's easy and practical to Rent an Ingram Roller. Easy—because all you have to do is call or contact your near-by Ingram distributor to rent an Ingram Roller by the day, week or month.

Practical...Renting an Ingram Roller allows you the use of a superior compaction roller as you need it.

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Tandem Rollers

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Drag Broom Levelers Street Push-Concrete RE FILLING BUILDING PAIRS

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BARGAINS USED EQUIPMENT

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 1—Caterpillar Motor Grader, Serial No. AT 5695.
 3—Adams Motor Graders, Models 414-412-312.
 2—Allis-Chalmers Motor Graders, BD2 & BD3.
 1—Galion Motor Grader, Model 201.
 1—Galion 1-30 Motor Patrol.
 1—Galion Model 116 Motor Grader.
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 1—Caterpillar D-2 with Traxcavator Endloader.
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 1—Burch B-100 Bituminous Spreader, like new.
 1—Case Tractor with Baker-Lull Front-end Loader.
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All the above equipment reconditioned

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- Cedars Super Commander Crusher with D353 Caterpillar Power Unit.
 Barber-Greene 845 Continuous Asphalt Plant with Boiler, Fuel and Asphalt Tanks.
 HL Hough Loader with 1-yard Bucket.
 Sauerman Scraper Unit Complete with Bucket, Cables, Mast, American Double Drum Hoist with 150 horsepower electric 440 3-ph. Motor, and Mast Blocks.
 International Harvester TD-18 Dozer.
 4 ea. 7 x 10 6 cu. yd. Single Post Webber Dump Beds.
 1 ea. Model TF Wisconsin Air Cooled Engine—approximately 15 horsepower.
 2 ea. Jeep Gasoline Engines.
 1 ea. 4-cylinder Wisconsin Air Cooled Gasoline Engine, 20 horsepower, directly connected to 1½" high pressure centrifugal Pump.
 1 ea. LeRoi Gasoline Engine.

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- D-8 Cat, Serial #2U12571 w/8A Angle Dozer and Cat 9D Series 25 DDP/CU. Super C. LeTourneau, S12 Euclid—(Both 90% rubber and undercarriage excellent).
 Koehring 205 Crane wth Backhoe and Drag Boom.
 Barber-Greene Ladder Trencher Model #44—Buda gas and old machine for parts.
 Homelite 3" Pump just overhauled w/ hoses.
 1958 Chevrolet ½ Ton Pickup—New paint—Excellent.
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 Assorted Sewer Contractors' Small Tools and three sand boxes: 2—8' x 8' x 36"; 1—8' x 16' x 36", reinforced ¼" steel.

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A heavy duty portable steam cleaner designed with the user in mind. All moving parts mounted in sealed ball bearings for rugged dependability and long life. Fully automatic, delivers a high volume of wet saturated steam at any pressure from 60 to 120 lbs., to cover any application. Mounted on large rubber tired wheels, and comes complete with 25 ft. steam hose and steam gun.

- Mark VII model converts 75 gal. of water per hr.
- Guaranteed one full year
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- 1—Barber-Greene Model 848 Asphalt Plant complete with storage tanks & heater. All electric plant in good condition. This plant produced 4,600 tons of asphalt last week.

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Phone: AD 6-0231

USED EQUIPMENT LIST

- One (1) Manitowoc Model 4500 Dragline
Equipped with 140' dragline boom, powered by Caterpillar D-13000 engine.
 One (1) Manitowoc Model 3900-B Crane—Clam-Drag
Equipped with 50' basic crane boom (65 ton capacity), all necessary hook blocks, rigging, Rud-O-Matic hoist, fairlead, third drum, light plant, powered by Cummins diesel engine with torque converter.
 One (1) Manitowoc Model 3500 Hi-Front Shovel
Equipped with 45' boom, 34' sticks, 2½ cu. yd. dipper, long crawlers, 33" treads, Kohler light plant, powered by Cummins diesel engine with torque converter.
 One (1) Manitowoc Model 3000 Crane
Equipped with 140' Boom, 20' jib, independent boom hoist, independent swing, long crawlers, 33" treads, powered by Cummins diesel engine with torque converter.
 One (1) Manitowoc Model 3000 Shovel
Equipped with 27' boom, 20' sticks, 2½ cu. yd. coal loading dipper, 14" 4" crawlers, 33" treads, Kohler light plant, powered by Caterpillar D-1700 engine.
 One (1) Manitowoc Model 3000 Crane—Clam-Drag
Equipped with 80' boom, air controls, long crawlers, 33" treads, powered by Caterpillar D-17000 engine.
 One (1) Manitowoc Model 2000 Liftcrane
 One (1) Model K375 Link-Belt Dragline
Equipped with 70' boom, 2 cu. yd. PMCO dragline bucket, 16" 4" crawlers, 30" treads, Kohler light plant, wiring and lights, catwalks, railings, powered by Caterpillar D-13000 Diesel Engine.
 One (1) American 25-Ton Rubber Tired Truck Crane
Equipped with 60' basic boom, independent boom hoist, third drum, powered by gas engine.
 One (1) Model 34 Lima Paymaster Combination Backhoe—Dragline—Crane
 One (1) 1201 Lima Standard Shovel Front
 One (1) 1201 Lima Hi-Front Shovel Attachment
 One (1) LSOK Lorain Crane
Powered by Caterpillar diesel engine.

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LORAIN—Model 45 - powered by Waukesha Gas with 50' of Boom. Good..... 2,950.00
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ROME—Model 401 - powered by 6 cyl. Hercules Diesel. Good 2,950.00

GRADALL

Model 2460—UD9 International Diesel UP and WXC5 Hercules Gas down. Fair..... 5,850.00

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JAEGER Model 4P - Centrifugal - 4" - powered by 4 cyl. Continental Gas Engine. Rebuilt 995.00

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1	LA-632 L.H. End Bit.....	Cat D7 Straight Dozer.....	24.44
2	LA-617 SPL End Bit.....	Cat D7 Straight Dozer.....	20.72
1	LA-617 R End Bit.....	Cat D7 Straight Dozer.....	13.60
1	LA-2717 L.H. End Bit.....	TD-24 Dozer.....	30.64
1	LA-2717 R.H. End Bit.....	TD-24 Dozer.....	30.64
6	LA-628 End Bit.....	Cat #12 Grader.....	9.24
2	LA-631 R End Bit.....	Overlay End Bit #12 Grader.....	11.44
2	LA-633 R.H. End Bit.....	D7 & D8 Angle Dozer.....	23.28
2	LA-633 L.H. End Bit.....	D7 & D8 Angle Dozer.....	23.28
2	LA-635 Blades.....	DB Straight Dozer.....	98.96
1	LA-697 RS E Assembly.....	DW-21 Scraper.....	532.00
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1	LA-26265 R.H.	HD-21 Straight Dozer.....	41.56
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1	LA-1317 Blade.....	HD-21 Straight Dozer.....	72.12
1	LA-2627 Blade (2 Pcs.).....	D7 Straight Dozer.....	74.36
1	LA-619 Blade (2 Pcs.).....	Euclid SH.....	39.28
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1 Mod. 12 Motor Grader—s/n BT 9624—with power steering & 1400x24 tires.....	10,500.00
1 Mod. 12 Motor Grader—s/n TDD 476.....	14,500.00
1 DB Tractor—s/n 2U 13341—with push block & mod. 25 power unit.....	12,000.00
1 DB Tractor—s/n 2U 15646.....	7,500.00
1 DB Tractor/Dozer s/n 13A 1293.....	13,500.00
1 DB Tractor/Dozer s/n 2U 17310.....	10,000.00
1 DB Tractor/Dozer—s/n 2U 22782.....	11,500.00
1 DB Tractor/Dozer—s/n 2U 15645.....	9,500.00
1 D9 Tractor—s/n 19A 312 Series D.....	19,500.00
1 D9 Tractor—s/n 18A 234 Series D—torque converter.....	22,000.00
1 D9 Tractor—s/n 18A 347 Series D.....	18,500.00
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1 HD20H Tractor—s/n HD20H 4934—with push block.....	5,000.00
1 HD20H Tractor—s/n HD20H 4011—with push block—new rails.....	6,500.00

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1 TD18A Tractor—s/n TD181 34493—with push block.....	9,000.00
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1 TD24 Tractor—s/n TDC241 716—with push block—torque converter.....	10,000.00
1 TD24 Tractor—s/n TDC241 705—with push block—torque converter.....	9,500.00
1 TD24 Tractor—s/n TDC241 1085—with push block.....	10,000.00
1 TD24 Tractor—s/n TDE 4441.....	7,500.00
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1 TD25 Tractor/Dozer—s/n TD241 10274.....	14,500.00
1 TD25 Tractor—s/n TD250 512—with push block (in shafts of Euclid Loader).....	26,500.00

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New Madsen Asphalt Plant Model 481, Serial No. 255, 4,000 pound plant with 5,000 pound pugmill and dryer capacity, complete with Hy-Way Hot Oil Heater, Model 35RC, 2-12,500 gal. skid tanks, 2-6,000 gal. skid tanks, air compressor, Asphalt Pump and Etnyre Distributor. Plant produced only 38,000 tons of material.

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- 1—36A - D-8 Series H Tractor, approx. 1400 hours, 8-5 blade and #29 cable control unit - New condition.
- 1—LeTourneau Westinghouse Model "C" full pack Scraper, used 3 mos. - New Cond.
- 1—Galion Trench Roller - Good condition.
- 1—Galion 10 Ton 3 Wheel Roller, International Diesel Engine.
- 1—Cat #25 Double Drum Cable Control - Rebuilt.
- 1—Cat 80 Pan with side boards, good rubber - Good condition.
- 1—AC 314 Pan, good rubber - Good condition.
- 1—Rud-O-Matic Tagline, can be used on 3/4 to 1 1/2 yard crane.
- 1—One Cubic Yard Erie Rehandling Bucket - New condition.
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Pair of Caterpillar D337 Marine Diesels, four to one hydraulic reverse gears, electric starting system, good operating condition. Price \$8,990.00

One 24" x 24" Eagle Impact Crusher, excellent condition. Extra parts but no hammers. (Hammers available) \$1,100.00

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Located: Gorge High Dam, Newhalem, Washington

1700 CFM Compressor, Joy WN-114, S/N 57147, 300 HP elec. motor
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75 Ton York Refrigeration Units, (2 ea.) 375 GPM Mild Brine to 25° F

Located: Priest Rapids Dam, Washington

Batch Plant, Johnson, 1100 yd. bin, four 4-yd. mixers, two 7300 bbl. cement silos, automatic controls, poison system, conveyors
3800 Manitowoc Crane, S/N 39139, Cummins Engine & 140' boom
3500 Manitowoc Crane, S/N 35050, Cummins Engine & 140' Boom
4 Yd. Shovel & Dragline, Marion 111M, S/N 21368, Cat. engine
5½ Yd. Shovel Attachment for Manitowoc 4500
1700 CFM Compressors (2 ea.) Joy WN-114-E, 18' x 80' receiver
40 Ton Stand. Gauge Diesel Electric Locomotive

Located: Niagara Falls, New York

Batch Plant, Johnson, 400 Cu. Yd. 8 Compartment, 4 Koehring Tilting Mixers, Auto Weigh Batchers, 7315 Bbl. and 800 Bbl. Cement Silos, Fuller Unloading System, Aggregate Reclaiming System, Aggregate Chilling System.
5 Steel Highway and 3 Multiple Span Steel Railway Bridges

Located: Glen Canyon Dam, Page, Arizona

Batch Plant, 300 cu. yd. Johnson (less Mixers), Auto-Recording Equipment, Charging Conveyor, Elevator Conveyors, Dismantled, ready for shipment.
4 Yd. Shovel, Lima 1801, S/N 3339-1B, Cummins engine, light plant, air controls
4 Yd. Shovel, Marion 111M, S/N 21444, Cat. D375 engine, air controls, light plant
27 Yd. Scrapers (4 ea.), Caterpillar 90, S/N's 9V5127, 28, 29 & 30
Refrigeration Chillers (3 ea.), York Model, A3188-50E, S/N's E367502, E367504 & E367499
Diesel Generators (10) 1100 KW 4160 Volt, 3 phase, 60 cycle, 720 RPM with automatic voltage regulators, switch gear, synchronizing panel, piping and spare parts

Located: Cougar Dam, Blue River, Oregon

3½ Yd. Shovel P & H 1055, S/N 19950, Cat. diesel
4 Yd. Shovel & Dragline, Marion 111M, S/N 21317, Cat. diesel

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Manufacturers' Literature

Continued from page 156

TRUCK-CRANES: Every major feature of Link-Belt Speeder's 20-ton HC-68A truck-crane is fully described and illustrated in a new 20-pg. catalog recently issued by Link-Belt Speeder Corp., 1201 Sixth St., Cedar Rapids, Iowa.

Included in the booklet is a section devoted to the carrier. Exclusive full-function design, which provides a completely independent, unrestricted power flow for each machine function, is explained in terms of user benefits.

For more details circle 155 on Enclosed Return Postal Card.

STREET MARKING: A new piece of literature explaining and discussing the uses of plastic street marking has been issued by the Electro-Metals Corp., 25 N. Pine St., Indianapolis 2, Ind.

The material is supplied in various shapes and comes in thin, flat strips of a tough flexible rubberlike plastic with adhesive backing. Used in places where traffic flow should be controlled without diverting the drivers attention, the markers are useful as center line markings, lane markings, barrier or no passing zone organization, railroad approaches, and pedestrian cross-walks.

Known as Reflect-O-Markers, the markers come in blue, black, green, white and yellow.

For more details circle 156 on Enclosed Return Postal Card.

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Paving & Grading Equipment

Liquidating Business

- 2—34E Dual Drum Pavers.
- 1—34E Single Drum Paver.
- 2—Jaeger Finish machines, 20' x 26' wide.
- 1—Jaeger Concrete Spreader.
- 2—Blaw-Knox 100 ton batching bins.
- 1—Johnson Cement Charger, Dual hoppers.
- 2—Koehring Buff floats - 18' to 26'.
- 4—Transit Mixers on Trucks.
- 2—S12 Euclids.
- 1—DW15 Cat.
- 1—S-7 Euclid.
- 3—D-8 Cats.
- 3—LeTourneau Scrapers.
- 1—LaPlante Scraper.
- 3—No. 12 Motor Graders.

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PRE-FAB BUILDINGS: A new and illustrated brochure describing the SF series of pre-engineered metal buildings for construction sites, industrial or municipal uses has been published by the Building Div. of Parkersburg Rig & Reel Co., Parkersburg, W. Virginia.

The 6-pg. booklet gives complete specifications for the rigid-frame buildings, available in clear-span widths from 32-ft. to 120-ft. and in unlimited lengths with addition of 16-ft. and 20-ft. bays. Standard eave heights range from 10 to 20-ft.

For more details circle 157 on Enclosed Return Postal Card.

FOR SALE

MICHIGAN Model C-16—½ yd. Trenchhoe, powered by Hercules Model JXD gasoline engine. Good condition.

INSLEY Model K-12—½ yd. Trenchhoe, powered by Waukesha gasoline engine. Rebuilt and guaranteed.

HOUGH—Model HMDC "PAYLOADER", 4-wheel drive, torque converter, 1½ yd. and 3 yd. buckets. Rebuilt.

BROWNING—Model SPR-13 Self-Propelled pneumatic tired Roller. Like new. Sacrifice.

ANDERSON EQUIPMENT COMPANY

P.O. Box 427 Bridgeville, Pa.
Phone: LEhigh 1-6020 (Pittsburgh area)

With the Manufacturers

J. I. CASE: Expansion of operations at the J. I. Case Co., Burlington, Iowa plant, involving activation for manufacturing purposes of a 141,000 sq. ft. of space previously reserved for storage, will be effected before the end of the present year, Case announced recently. The operation will involve expansion of the Burlington work force and will concentrate in one location the output of all models of Case Industrial crawler tractors.

SIKA CHEMICAL CORP.: P. A. Sieverling has been appointed sales manager for Sika Chemical Corp., Dr. Schmid, president, announced.

Sieverling will be responsible for the company's sales through its 11 district offices and its dealer franchises throughout the U.S.

PRECO INC.: Contractors and job supervisors are honoring their motor grader operators by securing for them Certified Preco Operator Awards.

Available only to expert operators also skilled in use of the Preco Automatic Blade Control, the awards consist of a distinctive sterling silver watch fob and handsome certification card. The purpose of the award program, states the sponsor, is to emphasize fine grading in construction.

Four-Year Scholarships: Five high school seniors have been awarded four-year civil engineering scholarships in a nation-wide selection program sponsored by the Armco Foundation, in cooperation with the National Society of Professional Engineers.

Granted on the basis of the student's scholastic records and aptitudes for engineering, the \$3000 scholarships were awarded by a selection committee made up of professional engineers and representatives of Armco Drainage & Metal Products, Inc. The five winners for this year are: Jeffrey Martin, Miami, Florida; Samuel Morris, III, Denville, N. J.; David Pedersen, Watson, Minn.; William Rogers, Logansport, Ind.; and Andy York, Santa Fe, N. M. Each winner will receive \$750 per year and the award money will be renewed each year the student satisfies predetermined standards.

Internal Combustion Engine Institute: New officer of the Internal Combustion Engine Institute were elected recently. They were as follows: President, C. E. Nelson, Jr., Waukesha Motors Co.; V. P., P. Norton, Wisconsin Motor Corp.; Sec'y, D. W. Onan II, Studebaker-Packard Corp.; Treas., E. V. Oehler, Briggs & Stratton Corp.; Director, G. W. Thomas, Continental Motors Corp., and Exec. Sec'y, C. G. Spice, of Chicago, Ill.

Rosco Mfg. Co.: John A. Miller, Sr., chairman of the board of Rosco Mfg. Co., died recently at the age of 74. Well known in the construction equipment field in the U. S. and Canada, Miller had been with Rosco since 1953, when he joined the firm as secretary. In 1954 he became president and later moved up to chairman in 1959. He graduated from Michigan State at East Lansing. No successor to the position has been announced.

REORGANIZATION OF MOTEC INDUSTRIES: Diversification of a product line of engines, power trains and transmissions, as well as expansion of related design development services for industry and original equipment manufacturers became the cause of the recent organization of the new Moline Automotive Div., that company has reported.

The new division has a full line of gasoline, LP gas, diesel and natural gas engines, transmissions, torque converters and the like. The expansion now enables Moline to offer a 2-speed power-shift shuttle transmission with optional matching drive axle, standard 5-speed manual shift with optional planetary torque amplifications and 2 or 4 wheel drive axles, together with many other pieces of equipment and replacement parts. The company announced that the move is in line with an effort to standardize basic dimensions in all Moline automotive products.

CIVIL ENGINEER ORGANIZATION: The California Council of Civil Engineers and Land Surveyors has awarded a \$1000 Planning Fellowship to Michael D. Flynn, civil engineering graduate student, U. of Southern California.

The first annual fellowship is awarded to prepare a civil engineering

graduate student in the field of city, community and land planning to assure proper design of future development projects.

OLIVER CORP.: The Oliver Corp. has strengthened its construction equipment sales organization as a separate industrial division and has named S. F. Beatty manager of the division, that company announced.

Oliver expects to gain greater penetration of markets for its light and medium crawler tractors, industrial wheel tractors and allied equipment.

GALVANIZERS: The American Hot Dip Galvanizers Association, with the cooperation of the American Zinc Institute, has announced that ten awards of \$1000 each will be offered for ideas developing new applications and markets for hot dip galvanizing. Each award will be accompanied by a medal and a certificate of achievement.

AMERICAN-MARIETTA CO.: The Southern Cement Co., a division of American-Marietta Co., has announced plans to begin construction this summer of a multi-million dollar cement plant near Atlanta, Ga. The new plant will have an initial capacity of 1.5 million barrels of Portland cement and has been designed so that production can be increased to 3 million barrels by the installation of a second kiln when additional capacity is needed.



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California's World Famous Resort overlooking the Blue Pacific where Wilshire meets the sea. Twenty minutes from International Airport, 450 luxurious rooms and bungalows, all with television and radio. Complete convention facilities. Banquet rooms for up to 2,000, air-conditioned. Exciting new Venetian Room and Contonese Room. Swimming pool . . . Beautiful grounds and landscaped gardens. Rates from \$8.

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